



# PHOENIX Quadro

# PHOENIX Quadro dry

Helium leak detector

Translation of the original operating instructions

Catalog Numbers

250000V02 (EU)

251000V02 (US)

251100V02 (JP)

250001V02 (dry, all countries)



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# 1 About these instructions

This document applies to the software version stated on the title page.

Product names may occur in the document, which are added for identification purposes only and belong to the respective owner of the rights.

## 1.1 Target groups

## 1.2 Warnings



### **DANGER**

Imminent hazard resulting in death or serious injuries



### **WARNING**

Hazardous situation potentially resulting in death or serious injuries



### **CAUTION**

Hazardous situation potentially resulting in minor injuries

### **NOTICE**

Risk for damage to property or the environment

## 2 Safety

### 2.1 Intended use

The device is a leak detector for detecting and measuring leaks in test objects. The device is suitable for leak testing as per the vacuum method and the sniffing method.

- Operate the device only according to this instruction manual.
- Comply with application limits, see "Technical Data".

#### Improper use

Avoid the following, non-intended uses:

- Use outside the technical specifications, see "Technical Data".
- Test of wet or damp test objects
- Pumping down of explosive, aggressive, corrosive, flammable, toxic or reactive substances
- Pumping down of condensable fluids and vapors.
- Pumping of gases contaminated with particles
- Shock loads or vibrations
- Using the device in potentially explosive atmospheres.
- Scanning of mains power cables with a sniffing probe
- Sudden ventilation of vacuum systems
- Connect a test object that is not vacuum resistant
- Pumping out gases containing halogens such as fluorine or chlorine in high concentration or over a long period of time. Use with refrigerants or SF6.
- Operation without exhaust pipe for devices with oil sealed backing pump

Note: This device is not intended to be used in residential areas.

### 2.2 Owner requirements

The following notes are for companies or any person who is responsible for the safety and effective use of the product by the user, employee or third party.

#### Safety conscious operation

- Only use the device when it is technically in good order and condition.
- Only operate the device in accordance with this instruction manual, in a safety and risk conscious manner.
- Adhere to the following regulations and observe their compliance:
  - Intended use
  - General applicable safety and accident prevention regulations
  - International, national and local standards and guidelines

- Additional device-related provisions and regulations
  - Only use original parts or parts approved by the manufacturer.
  - Keep this instruction manual available on site.
- Personnel qualifications**
- Only instructed personnel should be permitted to work with and on the device. The instructed personnel must have received training on the device.
  - Make sure that authorized personnel have read and understood the operating instructions and all other applicable documents.

## 2.3 Operator responsibilities

- Read, observe and follow the information in these operating instructions and the working instructions created by the owner, especially the safety instructions and warnings.
- Carry out any work only based on the complete operating instructions.
- If you have any questions regarding operation or maintenance that you cannot find answers to in this manual, please contact customer service.

## 2.4 Dangers

The measuring instrument was built according to the state-of-the-art and the recognized safety regulations. Nevertheless, improper use may result in risk to life and limb on the part of the user or third parties, or damage to the measuring instrument or other property may occur.

### Hazards due to liquids and chemicals

Liquids and chemical substances can damage the instrument.

- Never try to find toxic, caustic, microbiological, explosive, radioactive or other harmful substances with the device.

### Dangers from electric power

There is a danger to life from the contact of conductive parts inside the device.

- Disconnect the device from the power supply prior to any installation and maintenance work. Make sure that the electric power supply cannot be reconnected without authorization.

The device contains electric components that can be damaged from high electric voltage.

- Before connecting the device to the power supply, make sure that the supply voltage specified on the device is the same as the local power supply.

### Explosion hazard

Hydrogen is a flammable and explosive gas.

- Use only tracer gases with a concentration of hydrogen that cannot explode in combination with oxygen. The allowable composition of venal gas mixtures can be read in the safety data sheets of the respective manufacturers.

<b>Risk of uncontrolled movements as a result of being frightened</b>	<p>When operating the device in "vacuum" operation mode there will be a negative pressure created at the inlet flange.</p> <p>If the inlet flange is not properly closed by a blank flange or connected to a test set, the vacuum pull on your hands or limbs could be alarming or frightening.</p>
<b>Injury from bursting objects</b>	<p>There is risk of injury from bursting objects caused by a test object notwithstanding the vacuum pressure when a test object is connected.</p> <ul style="list-style-type: none"><li>• Take appropriate precautions.</li></ul>

## 3 Description

### 3.1 Function

The device is a leak detector for detecting and measuring leaks in test objects. The device is suitable for leak testing using the vacuum method and the sniffer method.

- When using the vacuum method the test object is evacuated and subjected to Helium or forming gas from the outside. To do this it is necessary to establish a vacuum connection between the device and the test object.
- When using the sniffer method an over-pressure is established in the test object using Helium or a forming gas. The test object is then inspected on the outside using a sniffer probe.

### 3.2 Operation modes

#### 3.2.1 Operation mode “Vacuum”

The inlet flange is located on the upper side of the device.

You can mount a suitable external calibration leak on the inlet flange and perform an external calibration, see also “External calibration [▶ 45]”. Alternatively, you can perform an internal calibration, see also “Internal calibration [▶ 45]”.

To be able to perform leak testing using the vacuum method the inlet flange must be connected to the desired specimen.

If the pressure in the specimen is less than the surrounding pressure, then Helium (which is sprayed over the specimen) can penetrate into the specimen if there is a leak. Helium can be detected in the leak detector using a mass spectrometer.

#### 3.2.2 Operation mode “Sniffing”

To be able to inspect test objects under overpressure with a sniffer line you can connect the sniffer SL300.

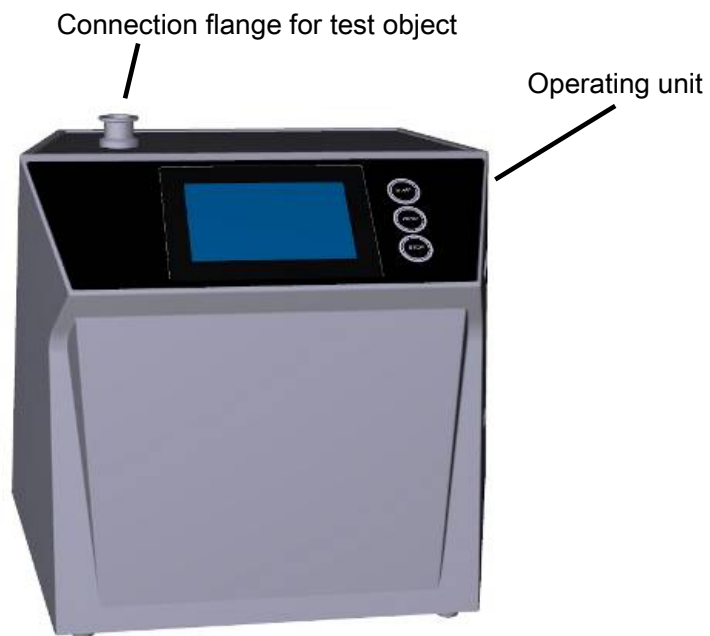
#### SL300

The vacuum connection of the sniffer line SL300 is connected to the upper side of the device on the inlet flange.

The electrical connection of the sniffer line SL300 is connected to the connector "ACCESSORIES" on the rear of the device, see "Connections for accessories and control signals [▶ 19]”.

## 3.3 Device setup

### 3.3.1 Overall device



*Fig. 1: Front view*

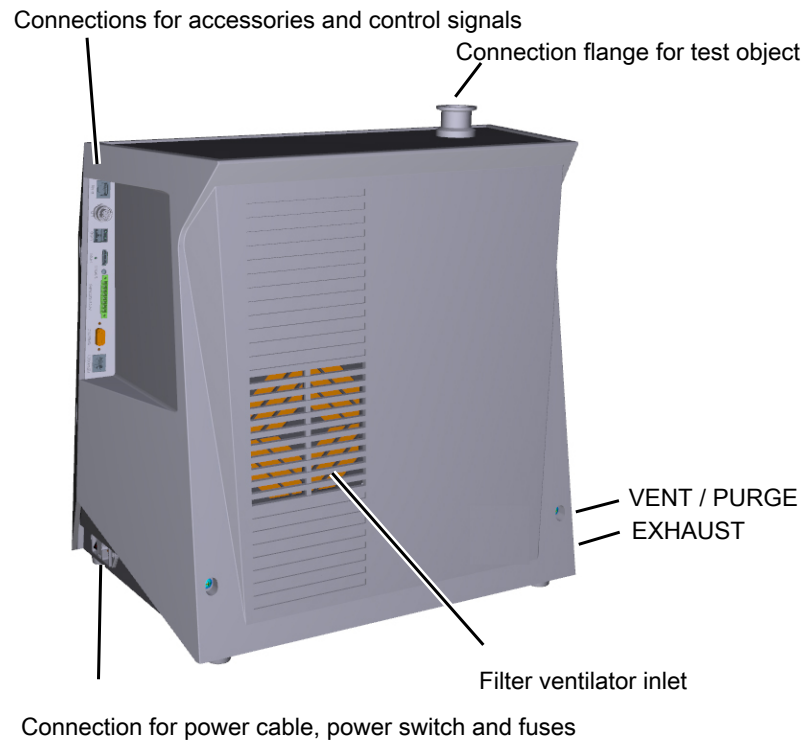


Fig. 2: Back view

### 3.3.2 Operating unit



Fig. 3: Control unit - front view

The control unit consists of a touchscreen and a control panel with the buttons START, STOP and ZERO (background suppression) on the housing.

See also "Assembly of the touchscreen [▶ 15]", see also "START button [▶ 12]".

The LED lighting of the buttons on the control panel changes its display color according to the device state, see also "Meaning of the button LEDs [▶ 13].

The remote control RC310 is optionally available, see also "Accessories and spare parts [▶ 68].

You can also operate the device using a notebooks or tablets, see also "Operate leak detector via web browser [▶ 75]".

**See also**

- 📖 Updating the software [▶ 54]
- 📖 Measurement data [▶ 47]



### 3.3.2.1 START button

- To start the measurements.
- Can be operated via touchscreen or on the control panel (Hardware button).
- If you press the START button on the control panel again during measurement, the maximum leak rate ( $Q_{max}$ ) that has occurred since START is displayed. See also "Assembly of the touchscreen [▶ 15]".
- If you press the START button on the control panel during measurement, the maximum leak rate display is updated.

Function	Touchscreen	Control panel
Starting		START button
Display maximum leak rate	Cannot be operated via touchscreen	Press the START button again.

### 3.3.2.2 STOP button



- To stop the measurements.
- Can be operated via the touchscreen of the control panel.
- Using the STOP button on the control panel you can do more than just stopping the measurements but also perform ventilation.

Function	Touchscreen	Control panel
Stop		STOP button
Vent		Press the STOP button again and keep it pressed for approx. 2 seconds.

Function	Touchscreen	Control panel
		(Prerequisite is the setting "ventilation mode" "manual", see Change vacuum settings [▶ 39] ".")

### 3.3.2.3 ZERO button

- To hide the "Background signal", see also "Definition of terms".
- Can be operated via the touchscreen of the control panel.
- Using the ZERO button you can switch ZERO on and off. For further details see "Set and use the function ZERO [▶ 41]".

Function	Touchscreen	Control panel
Background suppression ON		ZERO button
Background suppression OFF		Press the ZERO button again and keep it pressed for approx. 2 seconds.

The actual measured leak rate is considered to be a background signal. Depending on the selected variant of operation mode the background signal is hidden until the display limit of the respective vacuum range is reached.

After pressing the ZERO button, background suppression is automatically adjusted to the course of the falling leak rate signal. As a result, the detection of leaks is possible even with slowly falling signal.

Display limits according to factory setting:

$1 \times 10^{-7}$  mbar l/s in GROSS

$1 \times 10^{-10}$  mbar l/s in FINE

$1 \times 10^{-12}$  mbar l/s in ULTRA

To switch-off the function ZERO again, press the button ZERO for about 2 seconds.

The function ZERO should be activated only if the leak rate signal is stable and no leak is measured. See also "Set and use the function ZERO [▶ 41]".

#### See also

-  Change vacuum settings [▶ 39]

### 3.3.2.4 Meaning of the button LEDs

START button LED	STOP button LED	Meaning
Off	Flashing red	No connection to the control unit

START button LED	STOP button LED	Meaning
Pulsing blue	Pulsing blue	Run-up
Off	Green	Standby vented (Vent valve open)
Off	Blue green	Standby pumped out (Vent valve close)
Pulsing green	Off	Pump down
Off	Flashing green	Internal calibration
Flashing green	Off	External calibration
Green	Off	Measuring
Yellow (warning, faulty measurement possible)	Off	Measuring with warning not acknowledged
Off	Red	Error
Red	Red	Service mode is activated

ZERO button LED	
Off	No measurement operation
Off	ZERO blocked
Blue	ZERO OFF
Flashing blue	ZERO blocked by SMART-ZERO
Green	ZERO ON
Red	Service mode is activated

### 3.3.2.5 Meaning of the status LED

The status LED is located on the back of the instrument inside of the connector block for the equipment and control signals, see also Connections for accessories and control signals [▶ 19].

Status LED	Meaning
Flashing red	No communication with operating unit
Flashing blue	Run-up
Blue	Standby
Flashing green	Evacuate (pumping)
Flashing green	Calibrating
Green	Measuring
Yellow	Measuring with warning not acknowledged
Red	Error

### 3.3.2.6 Assembly of the touchscreen

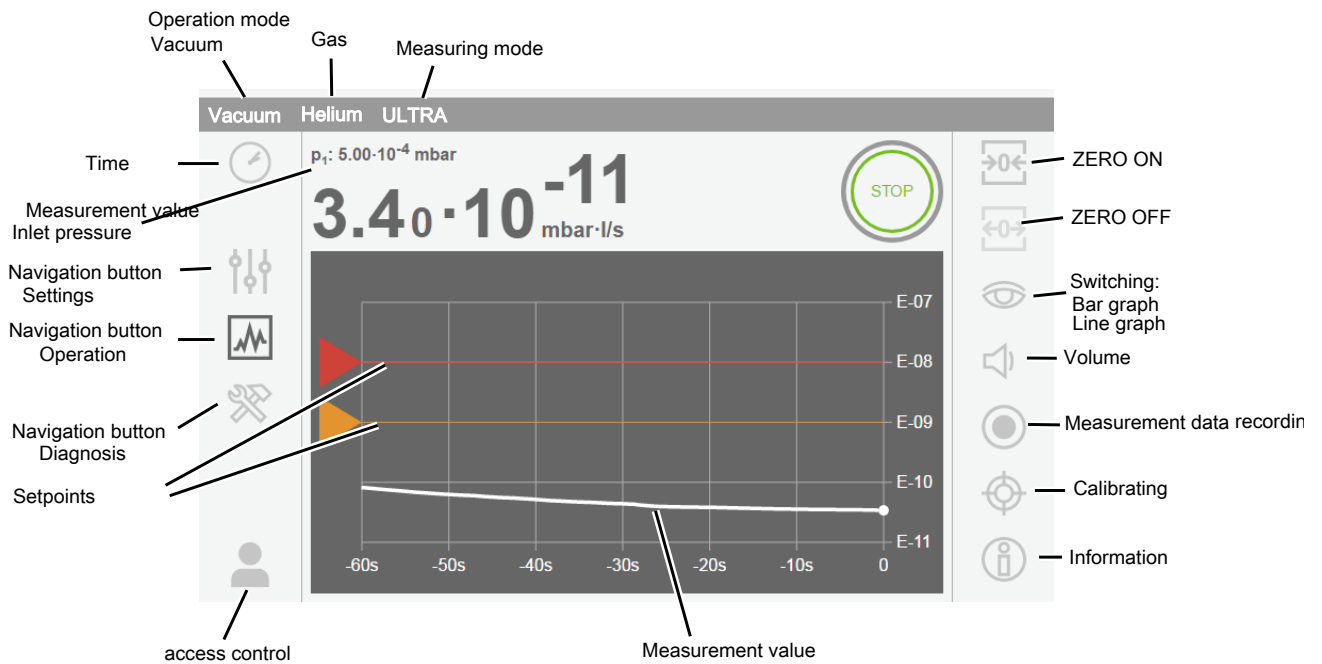
The display is a touchscreen.



The touchscreen responds to being touched lightly. To correctly select the chosen function, avoid strong pressure.

You can always see symbols for the navigation on the display.

Additionally, you can see, depending on the context, other symbols and elements.



#### Navigation buttons

The buttons can appear in different grey tones:

- Hidden: Function inactive
- Light grey: Function can be activated
- Dark grey: Function is active



**Settings**



**Operation**



**Diagnosis**

Table 1: Navigation buttons

#### Function buttons

The buttons can appear in two different grey tones:

- Light grey: Function can be activated
- Dark grey: Function is active

General function symbols

	Cancel ongoing function
	Confirm entry or selection
	Load
	Save
	Edit
	Delete

Table 2: Function buttons

### Other symbols

	Authorization "User"
	Authorization "Operator"
	Authorization "Supervisor"
	View the time or set the time

See also "Overview of Rights Groups [► 29]".

## 3.3.3 Vacuum connections

### 3.3.3.1 Inlet

The inlet is located on the upper part of the device. This is a DN 25 KF flange.

If you select the vacuum leak test mode, connect the test object or the vacuum chamber onto the flange.

If you are testing applications where dust or dirt is accumulating, use the O-ring with filter. In this case, the pump down times are extended.



Use the inlet for connecting the sniffer line SL300, too.

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### 3.3.3.2 Exhaust



#### **⚠ DANGER**

##### **Health risk due to exhaust fumes and vapors**

Depending on the connected container and the gas it is holding hazardous gases can enter the surrounding air via the exhaust of the leak detector.

If you have a device with an oil sealed backing pump, dangerous combustion products can arise, i.e. smoke, mist, sulfur oxide, aldehyde, and free carbon dioxide.

- ▶ Make sure you have protection measure to prevent inhaling hazardous gases.
- ▶ Connect an exhaust pipe at the exhaust, see also “Exhaust [▶ 17]”.

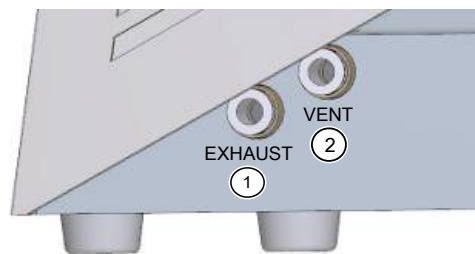


Fig. 4: Connections for exhaust, for venting and purging/gas ballast on the left of the device

1	EXHAUST: Exhaust	2	VENT: To vent the inlet. This connection can be used also for purging/gas ballast.
---	------------------	---	--

At the left side of the device there is the an exhaust, see “Connections for accessories and control signals [▶ 19]”. This is a quick connection for hoses with an outside diameter of 8 mm.

### 3.3.3.3 Connection for venting and purging/gas ballast

At the left side of the device there is the connection for venting and purging/gas ballast, next to “Exhaust [▶ 17]”.

Via this connection the inlet is vented, the backing pump purged (when the backing pump is wet: gas ballast) and the TMP vented when “power off”. This is a quick connection for hoses with an outside diameter of 8 mm.

#### **Vent**

Normally, the specimens are ventilated with ambient air after completion of the test. If necessary, the test specimens can be ventilated with a different gas (e.g., fresh air, dry air, nitrogen, etc.) to a maximum of 1050 mbar pressure.

**Purging/gas ballast**

To purge use a Helium free gas at atmospheric pressure. The surrounding air may be contaminated with traces of Helium due to spraying or filling up large containers. In such cases connect a gas supply line (this means Nitrogen or fresh air or similar) over the purge gas connection. The pressure of the gas line should not be more than 1050 mbar.

### 3.3.4 Connections for accessories and control signals

#### NOTICE



**The electronics of the device can be destroyed.**

- ▶ Only connect devices which are provided for the appropriate interfaces.

The connections for the external devices show a safe disconnection from the mains and are within the range of the safety extra low voltage (SELV).



Fig. 5: Connections for accessories and control signals at the back side of the device.

<b>REMOTE1</b>	For connecting the remote control RC310C via cable, maximum length 28 m, or for direct connection of the radio transmitter via an adapter. The remote control is not part of the scope of delivery of the device.
<b>REMOTE2</b>	Enables the connection via radio transmitter for the radio control via a special adapter.
<b>ACCESSORIES</b>	Electrical connection for sniffer line SL300 or partial flow system.
<b>STATUS</b>	To display the status of the device, see also “Meaning of the status LED [▶ 14]”.
<b>HDMI</b>	For connection to the HDMI interface of a touch monitor, maximum cable length 3 m.
	2 USB connections. To transfer data and to perform updates with an USB stick (FAT32-formatted). To connect a touch monitor via USB cable.
<b>LD</b>	Connection for bus module or I/O module, maximum line length 10 m
	Network interface, maximum length 3 m

**See also**

- ▣ Connection for venting and purging/gas ballast [▶ 17]
- ▣ Exhaust [▶ 17]
- ▣ Connecting the leak detector to the power supply system [▶ 25]

### 3.3.5 Markings on the device



Device cannot be scrapped with the normal domestic waste.

## 3.4 Technical data

### Mechanical data

Device with oil sealed backing pump, catalog numbers:

250000V02 (EU), 251000V02 (US), 251100V02 (JP)

	PHOENIX Quadro
Dimensions (L × W × H)	495 mm x 318 mm x 475 mm
Weight	41 kg
Inlet flange test object	DN 25 KF
Inlet flange prevacuum	-

Device with dry backing pump, catalog number:

250001V02 (all countries)

	PHOENIX Quadro dry
Dimensions (L × W × H)	495 mm x 318 mm x 475 mm
Weight	35 kg
Inlet flange test object	DN 25 KF
Inlet flange prevacuum	-

### Electrical data

Device with oil sealed backing pump, catalog numbers:

250000V02, 251000V02, 251100V02

	PHOENIX Quadro
Main fuse	2 x 250 V T10 A
Max. power	640 VA
Power port for backing pump	-
Supply voltage EU	220 – 240 V, 50 Hz 230 V, 60 Hz
Supply voltage US	110 -120 V, 60 Hz

	PHOENIX Quadro
Supply voltage JP	100 V, 50 / 60 Hz
Supply voltage multi-range power unit	-
Ingress protection	IP 40
Excess voltage category	II
Electronic interfaces	REMOTE1, REMOTE2, ACCESSORIES, HDMI, USB, LD, Ethernet

Device with dry backing pump, catalog number:

**250001V02**

	PHOENIX Quadro dry
Main fuse	2 x 250 V T10 A
Max. power	470 VA
Power port for backing pump	-
Supply voltage EU	-
Supply voltage US	-
Supply voltage JP	-
Supply voltage multi-range power unit	100 - 240 V, 50 / 60 Hz
Ingress protection	IP 40
Excess voltage category	II
Electronic interfaces	REMOTE1, REMOTE2, ACCESSORIES, HDMI, USB, LD, Ethernet

## Physical data

Catalog numbers:

**250000V02, 251000V02, 251100V02, 250001V02**

	PHOENIX Quadro, PHOENIX Quadro dry
Minimum detectable helium leak rate vacuum mode	$5 \cdot 10^{-12}$ mbar l/s
Response time	< 1 s
Maximum inlet pressure	15 mbar
Helium pumping speed ULTRA	>3.1 l/s
Detectable masses	$^4\text{He}$ , $\text{H}_2$ , mass 3

	PHOENIX Quadro, PHOENIX Quadro dry
Minimum detectable helium leak rate sniffer mode	$1 \cdot 10^{-8}$ mbar l/s
Gas flow through sniffer line SL300	20 - 25 sccm
Measurement range	12 decades
Run-up time	110 s
Ion source	2 long lasting iridium cathodes

### Ambient conditions

#### Catalog numbers:

250000V02, 251000V02, 251100V02, 250001V02

	PHOENIX Quadro, PHOENIX Quadro dry
Max. altitude above sea level	2000 m
Maximum relative humidity	80% at 30°C, linear decreasing to 50% at 40°C
Storage temperature	- 10°C to +60°C
Operating temperature	+ 10 °C ... + 40 °C
Pollution degree	2

## 4 Installation

### 4.1 Setup



#### **DANGER**

##### **Health risk due to exhaust fumes and vapors**

Depending on the connected container and the gas it is holding hazardous gases can enter the surrounding air via the exhaust of the leak detector.

If you have a device with an oil sealed backing pump, dangerous combustion products can arise, i.e. smoke, mist, sulfur oxide, aldehyde, and free carbon dioxide.

- ▶ Make sure you have protection measure to prevent inhaling hazardous gases.
- ▶ Connect an exhaust pipe at the exhaust, see also “Exhaust [▶ 17]”.



#### **WARNING**

##### **Danger from moisture and electricity**

Moisture entering the device can lead to personal injury due to electric shocks as well as damage to property due to short circuiting.

- ▶ Only operate the device in dry environments and only in buildings.
- ▶ Operate the device away from sources of liquid and moisture.
- ▶ Place the device where you can always reach the mains plug.
- ▶ Do not operate the device standing water and do not let even a drop of water or other liquids on the device.
- ▶ Prevent the device from coming into contact with bases, acids and solvents.

## NOTICE

### Material damage from overheated device

The device heats up during operation and can overheat without sufficient ventilation.

- ▶ Please note the technical specifications.
- ▶ Ensure sufficient ventilation, especially on the ventilation slots on the left and right of the device: There should be free space in the front, to the rear and sides of the unit of at least 10 cm.
- ▶ Keep heat sources away from the device.

## NOTICE

### Operating system can be attacked via USB or Ethernet

The Linux operating system used in the leak detector is not updated automatically and can therefore contain security gaps. This vulnerability may be exploited through the Ethernet and USB interfaces of the leak detector to provide unauthorized access to the system.

- ▶ Ensure that no unauthorized person has access to these interfaces, for example through a USB port / Ethernet port lock.
- ▶ In order not to jeopardize the security of your company network, never connect the leak detector directly to the public Internet. This is true for connections over WLAN as well as over Ethernet.
- ▶ However, if you want to access the web interface of the leak detector remotely, we recommend an encrypted Virtual Private Network (VPN) connection. However, we cannot assume any guarantee for the security of VPN connections, which are provided by third parties.



### Prevention of measurement errors due to leaks in the Helium source in the device surroundings

We recommend that you regularly check around the device to a distance of 10 m all large Helium sources for gross leaks. Use a sniffer line to do this.

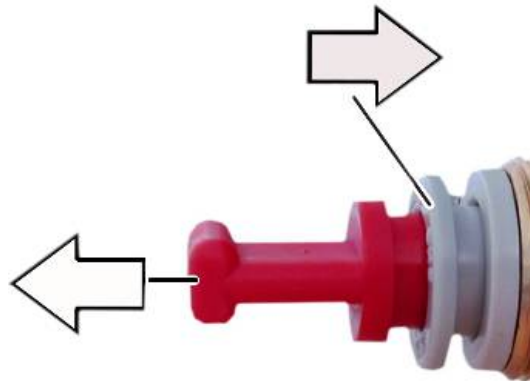
## 4.2 For oil-sealed backing pumps, remove the plug



### Malfunction of the pump system with inserted plug in the exhaust line

On devices with oil-sealed backing pump, the exhaust is protected by a plug against leaking oil.

- ▶ For devices with oil-sealed backing pump, remove the plug before switching it on.
- ▶ To remove the plug press the release ring in the direction of the device so that the locking device releases. Pull the plug out while release ring is pressed.



## 4.3 Connecting the leak detector to the power supply system



### ⚠ WARNING

#### Danger from electric shock

Improperly earthed or protected products may be dangerous to life in case of a fault. The use of the device is not permitted without a connected protective conductor.

- ▶ Only use the included 3-wire power cable.
- ▶ Make sure that the mains plug is always accessible.

### NOTICE

#### Damage through wrong power supply

- ▶ Only connect the device to the power supply when the tension shown on the type plate corresponds to the one of your power supply connection.

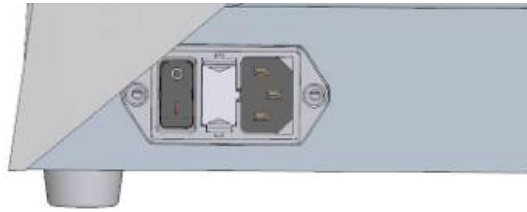


Fig. 6: Power supply and on / off switch are at the right side of the device

## 4.4 Check the Operation of the Device

### NOTICE

#### Damage to the turbo molecular pump due to jerking movements

Jerking movements can damage the running turbo molecular pump.



- ▶ Avoid any jerking movements or vibrations to the instrument during operation and for up to 1 minute after switching off.

Do not switch on the device when the ambient temperature is less than 10 °C.

✓ A DN 25 KF blank flange is available (if not already installed on the inlet flange).

✓ A helium calibration leak is available (optional).

- 1 Check if the inlet is blank flanged. If this is not so, flange a blank flange with an O-ring gasket on the inlet on the upper side of the device.
- 2 If your leak detector has an oil sealed backing pump, connect an exhaust line at the exhaust port, see also Exhaust [▶ 17].
- 3 Connect the device to the mains supply.
- 4 Switch on the leak detector via the mains switch.
  - ⇒ After switching on pieces of status information are shown on the touchscreen about the speed of the turbo molecular pump, the pre-vacuum pressure, the emission and the active cathode. The start process takes about 3 minutes and is completed with a short acoustic signal. Now, the device is in "Standby" mode.
- 5 Press the START button.
  - ⇒ The inlet is evacuated and then the measuring mode for the measured leak rate is shown.  
In case a test object was connected, you would start with spraying helium on the outside.
- 6 In case you would like to suppress any possible existing background signals (Helium background in the test object) press the ZERO button.  
In order to reverse the background suppression press the ZERO button on the control panel for 2 - 3 seconds, see "ZERO button [▶ 13]".
- 7 Press the STOP button.

- ⇒ The device switches to the mode "Standby".  
If you press the STOP button on the control panel for a few seconds the inlet of the device is ventilated.
- 8** If you want to end the test now you can switch off the device.
- 9** If you want to check the internal calibration wait, for getting a better quality of measurement results, 15 to 20 minutes until the device has warmed up.
- 10** To call the calibration menu press on the cross hair icon .
- 11** Select "Internal".
- 12** Press the  button.
- ⇒ The automatic internal calibration starts and requires approx. 30 seconds.
- 13** If you want to check the measurement accuracy of the device using the optional Helium calibration leak remove the blank flange from the inlet and connect an open Helium calibration leak onto the inlet.
- 14** Press the START button.
- ⇒ The inlet is evacuated and the leak rate of the test object is measured and displayed.
- 15** Press the STOP button to interrupt the measurement.
- ⇒ The leak detector changes into the Standby mode.
- 16** Press the STOP button on the housing until the message STANDBY / VENTED appears on the display.
- ⇒ The inlet is now in the vented state.
- 17** Separate the Helium calibration leak from the inlet and flange the inlet blank again.
- 18** Switch off the device via the mains switch.

## 5 Operation

### 5.1 Switch ON

► To switch on the device, press the power button.

⇒ When delivered the device shows the screen "Standby" after run-up.

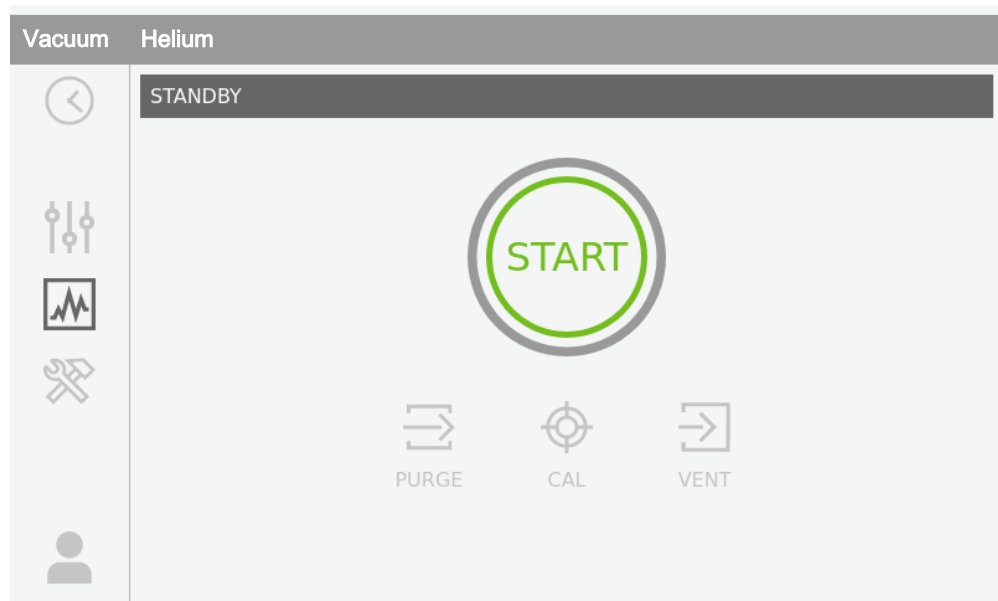


Fig. 7: Window "Standby"

	Starting the measurement		Calibrating
	Purging/gas ballast		Vent

### 5.2 Basic settings



You are able to save the actual settings of the device at any time, so that you can use them at a later time, see also "Saving and managing sets of parameters [▶ 52]".

#### 5.2.1 Setting date, time and time zone

✓ **Supervisor** - rights

- 1 > Setup > General > Date and time
- 2 Set up.
- 3 Save .


Alternatively, press in the upper window bar and make your settings.

## 5.2.2 User profile settings

### 5.2.2.1 Overview of Rights Groups


The rights of a user depend upon which group he belongs to.

#### User

Members of the group  **User** can


- perform measurements,
- view history of the measurement results,
- view device information,
- view error logs.

#### Operator

Members of the group  **Operator** have all the rights of the group **User**. Moreover, they can



- create / modify / delete users,
- export / delete measurement data,
- modify measurement settings,


#### Supervisor

Members of the group  **Supervisor** have all the rights of groups **User** and **Operator**. Moreover, they can

- create / modify / delete operators,
- create / modify / delete supervisors,
- Perform software updates,
- modify date / time.

### 5.2.2.2 Select, modify, create user profile

✓   **Operator** or **Supervisor** rights

1  > Users


⇒ Existing users and associated groups are displayed in list form.

2 You have the following possibilities:


To create a new user profile, select  at the bottom of the window.

⇒ The "User profile" window opens.


Otherwise, press an already created user name and choose from the tool bar:

, to load a user profile.

⇒ The login window opens.

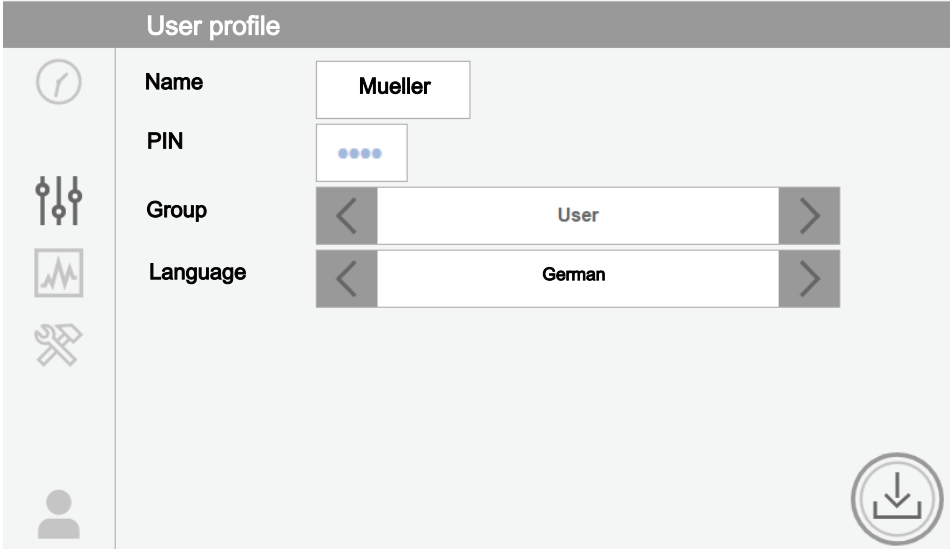
, to modify a user profile .


⇒ The "User profile" window opens.

, to delete a user profile .

⇒ A confirmation screen appears.

- 3 After selecting some tools, the “User profile” window opens. If this window opens, enter a user name, change it, or keep it as required.



- 4 If the "PIN" field is not filled in or you want to change the content, enter a 4-digit PIN.
- 5 To assign the required rights to the user, select a group. Via < and > select between the groups User, Operator and Supervisor. See "Overview of Rights Groups [▶ 29]".
- 6 In the field "Language" assign a language to the user via < and >.
- 7 Save .

### 5.2.2.3 Modify Personal Settings

As a user with limited rights (**User**) you can also modify your language or PIN. By this the associated user profile is correspondingly adapted. Access to the entire user profile is not necessary.

- 1 Press on your name which appears on the top left of the display.
  - ⇒ The window "User accounts" opens.
- 2 Select the “Change own PIN” or “Change own language” button as required.

## 5.2.3 Switch off Automatic Login



### Factory setting

As per factory settings, after switching on the device the user "Supervisor" automatically logs in and the measurement screen is called. This default user also has the permissions of the group "Supervisor". Without changing this setting, any user can operate all functions without restriction.

You can specify that the login window appears after you turn on the device instead of automatically logging on.

In the login window, all users can login, which have been already registered in the device, see "Select, modify, create user profile [▶ 29]".

#### ✓ Supervisor - rights

1  > User accounts > Manage Auto Login

2 In the "Manage Automatic Login" window, deactivate the option "Active".

3 Save .


⇒ After restarting the device, the current settings are applied.

## 5.2.4 Switch on Automatic Login

You can specify if a user of your choice is automatically logged in after the device is switched on without the login window.

#### ✓ Supervisor - rights

✓ The requested user was already created. See "Select, modify, create user profile [▶ 29]".

1  > User accounts > Manage Auto Login

2 Enter the name of the user in the "Name" field. Note the uppercase / lowercase.


3 Enter the current PIN of the user profile in the "PIN" field.

4 In the window "Manage Automatic Login", activate the option "Active".

5 Save .

## 5.2.5 Presentation of the measurement screen



To switch between the different diagram presentation press  on the measurement screen, see "Assembly of the touchscreen [▶ 15]".

You can select between the following presentations:

- Line graph

- Bar graph

You can further configure the different diagram presentations. See "Changing the presentation of the line graph [▶ 32]" and "Changing the presentation of the bar graph [▶ 33]".

### 5.2.5.1 Changing the presentation of the line graph

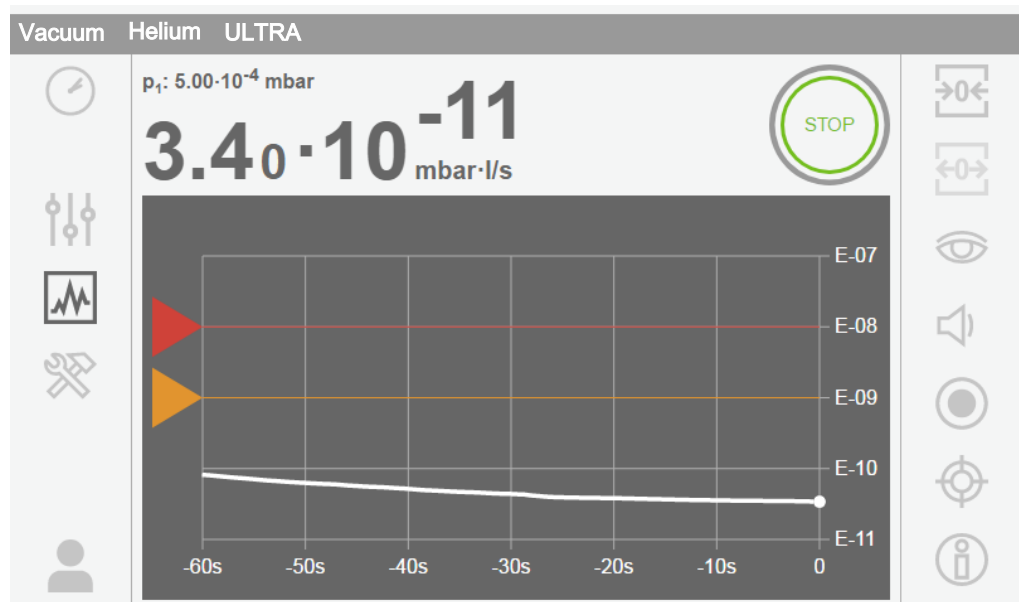


Fig. 8: Presentation of the line graph

#### ✓ 👤 Operator or Supervisor rights

- 1 > Display > Line graph
- 2 In the field "Scaling" select between "Linear" and "Logarithmic".
- 3 Select between the different viewable "Decades".
- 4 To dynamically adjust the upper and lower limit on the leak rate, activate the option "Autoscale".
- 5 In the field "Time axis" select the length of the time axis "30", "60", "90", "120" or "240" seconds.
- 6 If the option "Autoscale" is not active, select "Lower diagram limit" in the field the desired decade.
- 7 Save .

### 5.2.5.2 Changing the presentation of the bar graph

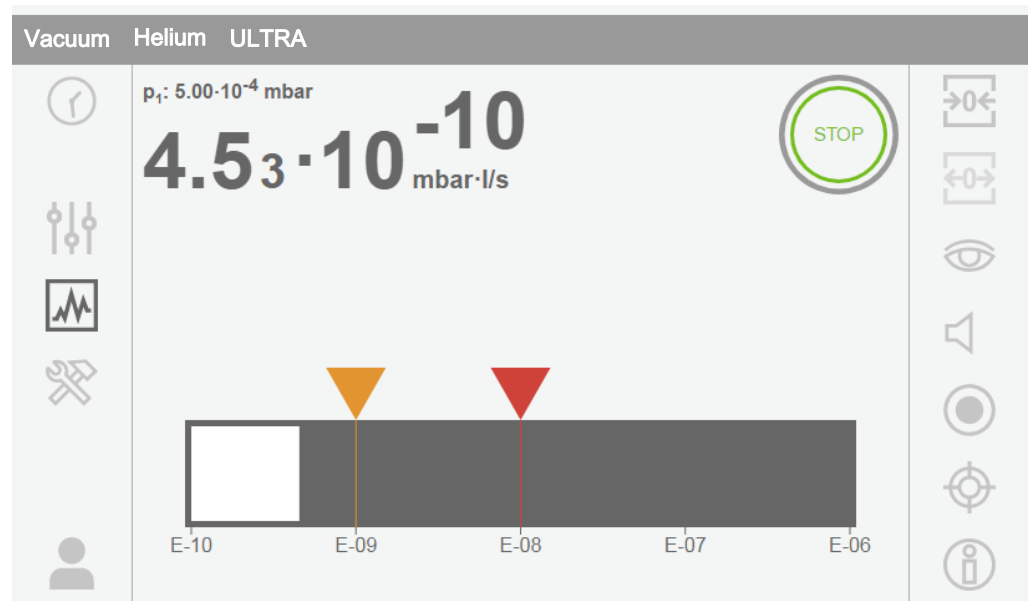





Fig. 9: Presentation as bar graph

#### ✓ Operator or Supervisor rights

- 1  > Display > Bar graph
- 2 In the field "Scaling" select between "Linear" and "Logarithmic".
- 3 Select between the different viewable "Decades".
- 4 To dynamically adjust the upper and lower limit on the leak rate, activate the option "Autoscale".
- 5 If the option "Autoscale" is not active, select "Lower diagram limit" in the field the desired decade.
- 6 Save .

### 5.2.5.3 Change general display settings

#### ✓ Operator or Supervisor rights

- 1  > Display > General
- 2 If very small leak rates are of no interest to your application and you want to raise the lower leak rate limit, select between 1 to 6 decades in the "Raise lower leak rate limit". Raising the lower leak rate limit can facilitate the assessment of the leak rate display.
- 3 To set whether to display the internal background leak rate in the "Standby" window, enable or disable the "Show background at standby" option.  
The internal background is created from the remaining gas, which has not yet been pumped out. Very clean systems show a background in the range of  $1 \times 10^{-11}$  mbar l/s. Under normal conditions there is a background of  $1 \times 10^{-10}$  mbar l/s or  $1 \times 10^{-9}$  mbar l/s.



- 4 Save .



## 5.2.6 Change units

For the vacuum operation mode you can select between "Torr·l/s", "atm·cc/s", "Pa·m<sup>3</sup>/s", and "mbar·l/s".

After switching the operation mode "Sniffer" in addition to the modes mentioned above you can also select between the units "oz/yr", "g/a" and "ppm".

You can also choose between the following pressure units: "mbar", "Pa", "atm" and "Torr".

✓   **Operator or Supervisor rights**

- 1  > Setup > General > Units
- 2 If necessary change the units of the "Leak rate unit vacuum", the "Leak rate unit sniff" and the "Pressure unit".
  - ⇒ The option "Equal to display" is activated according to the factory settings so that the units for the interface can be shown exactly as the units of the device.
- 3 In order to independently select the units of the interface deactivate the option "Equal to display".
  - ⇒ Further fields to set the units of the interface are shown.
- 4 To order to set the selected units so that they can also be used for the interface, activate the option "Equal to display".
- 5 Save .

## 5.2.7 Change audio settings

In addition to the visual display of the measurement results you can change the settings to the volume, to the Notification beep and to the audio alarm.






### **WARNING**


#### **Damage to the hearing due to loud audio**

The alarm level of the device can exceed 85 dB(A).

- ▶ Adjust the volume accordingly.
- ▶ Only expose yourself a short time to the alarm.
- ▶ Use hearing protection.

✓   **Operator or Supervisor rights**




- 1  > Audio

- 2 In order to change the volume of the audio alarm and the notification sounds, select the desired "Volume". Do not fall below the set value for the "Minimum volume" in the next field
  - ⇒ Setting range: 0 ... 15
  - ⇒ You can listen to the set volume using the "Test" button.
- 3 If necessary, change the minimum volume.
  - ⇒ The "Minimum volume" is the volume for the audible alarm which cannot be undershot. If you select a value greater than 0, the lowest volume level is shown on the measurement screen after pressing the volume icon. This allows you to prevent a non-authorized person from setting a value that is below the ambient noise level.
  - ⇒ Setting range: 0 ... 15
- 4 If you want to define the cause of an alarm or the type of notification beep more accurately, then make your selection with the "Audio alarm mode" between "Leak rate proportional", "PINPOINT", "SETPOINT", "TRIGGER" and "Off".
  - ⇒ "Leak rate proportional": The frequency of the audible signal is proportional to the bar graph display or diagram height. The frequency range is 300 Hz to 3300 Hz.
  - ⇒ "PINPOINT": The sound of the acoustic signal changes its frequency within a specific range of leak rates. This range extends from a decade below the selected setpoint value to a decade above. Below this leak rate range, the sound is constantly low, above the sound is constantly high.
  - ⇒ "SETPOINT": The pitch is proportional to the leak rate. The signal sounds if the leak rate exceeds the set setpoint 1. See also "Setting setpoints [▶ 38]".
  - ⇒ "TRIGGER": If the set setpoint 1 is exceeded, then a two-pitch signal is issued. See also "Setting setpoints [▶ 38]".
- 5 If you want to suppress the alarm for some time after pressing the START button, then set "Audio alarm delay". For example: Time period during the pump down of a test chamber system.
  - ⇒ After pressing the START button the audible signal is activated as soon as the leak rate falls below the setpoint value 1 or the alarm delay time expires. This setting is only for the audible alarm type "Setpoint" and "TRIGGER".
- 6 If you wish to have notification beeps, activate the option "Notification beep".
- 7 Save .

## 5.2.8 Change the protection settings

You can protect the device from Helium contamination with gross leaks and from the penetration of particles. Furthermore, you can change the maximum evacuation time.

✓  **Supervisor** - rights

- 1  > Setup > Measurement > Protection
- 2 If you want to switch-on the gross leak protection, activate the option "Gross leak protection" and set under "Gross leak protection limit" a shut-down threshold.
  - ⇒ The device closes the inlet valve as soon as the measured leak rate exceeds the shut-down threshold. This will prevent an excess amount of helium from entering the mass spectrometer. Consequently, the leak detection unit is prevented from becoming contaminated by Helium. The helium entering the specimen can be pumped out using an external pump. If no external pump is being used, we recommend that the test object is vented before continuing with the measurement.
- 3 If you want to prevent particles from being sucked into the device make sure that the test object is first pumped down with another parallel running pump. Activate the option "Particle protection" additionally.
  - ⇒ The leak detector only starts with the pump down once the inlet pressure has fallen below 1 mbar.
- 4 To change the maximum evacuation time after a gross leak is detected, enter the desired time in seconds under "Max. evacuation time gross leak".
  - ⇒ This setting determines when a gross leak warning message is signaled. The factory setting is 600 s. If the inlet pressure drops below 100 mbar within this time span, a fault message is signaled. This menu point is especially useful with series tests that always have the same test conditions.  
After pressing the START button the specimen is evacuated. If the corresponding pressure conditions ( $p_1 < 100$  mbar) is not reached within the time that is to be set here or falls below, the pump down process is aborted and a warning message appears in the display.  
The time that is to be selected depends on the one hand on the desired reaction time for the gross leak message and on the other hand on the volume of the test object and from the affect of the pumping speed.  
If the pump down process should not be aborted enter "0". This corresponds to the entry "infinitely".
- 5 To change the maximum evacuation time before the measurement, enter the desired time in seconds under "Max. evacuation time until measurement". The "evacuation time until measurement" is about the time until the first approved measuring range is reached. The factory setting is 1800 s.
  - ⇒ If the anticipated pressure conditions are not reached during the evacuation time, a warning message is shown after the expiration of the evacuation time. For the pressure conditions, see also the following setting options:  
 > Setup > Measurement > Pressure limits  
and  
 > Setup > Measurement > Vacuum > Vacuum range

6 Save .

### See also

 Change vacuum settings [[▶ 39](#)]

## 5.2.9 Activate or deactivate maintenance requests

Enables or disables warnings when the time for maintenance is exceeded. The time until the next maintenance is displayed.

✓  **Supervisor** - rights

1  > Setup > Maintenance requests

⇒ In the "Enable/disable maintenance requests" window, you can activate or deactivate the maintenance requests for the following modules:



- Calibration leak
- TMP
- Filter sniffer tip
- backing pump
- Exhaust filter
- Air filter

2 Set up.

3 Save .

## 5.2.10 Modify Other Settings

- You can set whether you need to be notified for calibrations or not. The factory setting is "OFF".
- Furthermore, you can, for safety reasons for example, set whether the device is only to be operated via the touchscreen and not via the buttons on the control panel or via the remote control. The factory settings for the "Local operation" is activated and allows all operating possibilities.

✓   **Operator** or **Supervisor** rights

1  > Setup > Measurement > Miscellaneous

2 If you want to switch-on the calibration request, activate the option "Calibration request".

⇒ If this option is switched-on there is a corresponding message 30 minutes after switched-on or when the temperature of the device has changed by more than 5 °C since the last calibration.





3 If you want set whether the device is only to be operated via the touchscreen deactivate the option "Local control".

⇒ The buttons START, STOP and ZERO are then blocked in the control panel. The buttons of the remote control can also not be used.

- 4 Save .

## 5.3 Settings for the measurements

### 5.3.1 Select operation mode

- ✓   **Operator** or **Supervisor** rights
  - 1  > Operating mode
  - 2 Select between "Vacuum" and "sniffing / SL300".
  - 3 Save .

### 5.3.2 Select gas






#### **DANGER**

#### Danger from a Hydrogen explosion

Hydrogen can explode in combination with oxygen. The allowable composition of venal gas mixtures can be read in the safety data sheets of the respective manufacturers.

- ▶ Ensure that the share of hydrogen does not exceed the described concentration.

- ✓  **Supervisor** - rights
  - 1  > Setup > Measurement > Mass
  - 2 Make a selection from:
    - "Hydrogen"  $H_2$  (2 amu)
    - "Helium"  $^4He$  (4 amu)
    - "Mass 3"  $^3He$  (3 amu)
  - 3 Save .





### 5.3.3 Setting setpoints

You can set the leak rate for the setpoint to 1, 2, 3 and 4 separately.

When the setpoints are exceeded:

- If the setpoint 1 or 2 is exceeded, the measurement line in the measurement window changes color.
- The setpoint relay of the digital output switches, see also "I/O module [▶ 70]" or the interface description.

Also setpoint 1 defines the trigger point for the different alarms, see also "Change audio settings [▶ 34]". It is also the limit for SMART, see "Set and use the function ZERO [▶ 41]".

- ✓   **Operator** or **Supervisor** rights
  - 1  > Setpoints
  - 2 Set up.
  - 3 Save .





### 5.3.4 Change vacuum settings

#### Vacuum ranges


You can activate the vacuum ranges GROSS, FINE and ULTRA for your measurements. activate for measurement activate for measurement Vacuum ranges Vacuum ranges





All 3 areas can be activated at the same time. If several areas are activated, they switch automatically depending on the inlet pressure. In this way different sensitivities can be measured with.

At least one range must be activated.

- ✓   **Operator** or **Supervisor** rights
  - 1  > Setup > Measurement > Vacuum
  - 2 Activate the desired vacuum range under "Vacuum range".
  - 3 Save .





#### Vent

Under "Vent mode" you have the choice between "Immediate", "No ventilation" and "Manual". If "Immediate" is activated, the ventilation is triggered when changing to Standby. If "manually" is activated the ventilation is only triggered after a prolonged pressure on the button STOP or by pressing at  in the window "Standby".

- ✓   **Operator** or **Supervisor** rights
  - 1  > Setup > Measurement > Vacuum
  - 2 Set up.
  - 3 Save .

#### Purge/Gas ballast

You can automatically purge the backing pump for 20 seconds when you change to "Standby".

- ✓   **Operator** or **Supervisor** rights
  - 1  > Setup > Measurement > Vacuum
  - 2 If necessary activate or deactivate the option "Automatic purge".
    - ⇒ If you switch off the automatic purging you can switch on or off the purging by pressing .

3 Save .

### 5.3.5 Setting the machine factor

If you are measuring in the operation mode "Vacuum" and using an external pump in parallel, the measured leak rate would be too small in comparison to the leak rate based on an internal calibration.

If you would like to compensate for this you can multiply the measured leak rate with the suitable machine factor and then have the value shown. This factor is used only in the vacuum mode and not in the sniffing mode.

When taking into consideration the Helium pumping speed of the device, the machine factor can also be estimated. The measurement of the leak rate is more accurate using an external calibration leak with the test object - once with the external pump switched and once without. The machine factor then results from the quotient of the calculated calibration factors.

The machine factor can also be used to correct the leak rate display with respect to the air equivalence. The machine factor for this correction is 0.37.



#### Using Quicktest QT100

If you are measuring in the operation mode "Sniff" and have a Quicktest QT100 connected to the inlet, the measured leak rates would be too small compared to leak rates based on internal calibration. For the Quicktest QT100 a machine factor of approx. 400 has to be set.



To obtain accurate results based on internal calibration, it is necessary to compare this factor with an external calibration leak. For this, calibrate both with an external and the internal calibration leak and note the determined calibration factors in each case.


Correct the machine factor using the following formula:

$$\text{New machine factor} = (\text{old machine factor}) * (\text{External calibration factor}) / (\text{Internal calibration factor})$$

Calibrate again after adjusting the machine factor!

Further information can be found in the operating instructions for the QUICKTEST QT100.

✓   **Operator or Supervisor** rights

1  > Setup > Measurement > Calibration leak


⇒ The field "Machine factor helium" is shown.

2 Set up.

3 Save .

### 5.3.6 Set external calibration leak

To use an external calibration leak for calibration, enter the leak rate of the calibration leak.

✓  **Operator** or **Supervisor** rights

1  > Setup > Measurement > Calibration leak

2 Adopt the printed value and the associated unit from the calibration leak or certificate.

Do not change the combination of the printed value and associated unit, even if your device is otherwise set to other units!

3 Save .

**See also**


 External calibration [[▶ 45](#)]

### 5.3.7 Change pressure limits

Pressure limits for the vacuum mode.

With this function the factory-set switching points between the vacuum ranges GROSS, FINE and ULTRA can be changed. This can be necessary if the device is pumped down with gases other than air. The pressure signal of the gas type inlet pressure gage (Pirani) can then deliver the corresponding switching values of the sequence flow of the device. By changing the preset switching point this can be compensated for. GROSS GROSS Vacuum ranges Vacuum ranges FINE FINE Vacuum ranges Vacuum ranges ULTRA ULTRA Vacuum ranges Vacuum ranges Change pressure limits Change pressure limits Vacuum ranges Vacuum ranges

✓  **Supervisor** - rights

1  > Setup > Measurement > Pressure limits

⇒ You can change the named pressure limits. Preset values see "Factory settings".

GROSS -> FINE

FINE -> ULTRA

2 Set up.

3 Save .

### 5.3.8 Set and use the function ZERO

**Why should I use ZERO?**

To be able to clearly measure small leakages the function ZERO should be used.

With each leak testing there is a "Background signal" (see "Definition of terms") that disrupts the search or the measurement of leakages.

- To hide the background signal, activate the function ZERO.

- You can also use ZERO to hide a currently displayed leakage, which interferes with searches for other or even smaller leaks.



**A currently displayed leak is hidden through ZERO.**

By using the function ZERO not only is the background signal hidden, but also the representation of a current leak.

- ▶ Only activate the ZERO function, if a leak is not measured at the same time. The ZERO function should be activated before the tracer gas is used.

**Activate or deactivate ZERO**

ZERO is activated by factory settings.

✓ **Supervisor** - rights

1 > Setup > Measurement > ZERO and filter

2 If necessary change "ZERO mode". The factory settings is "SMART".

⇒ Effect of SMART: The ZERO function remains blocked until the background decreases sufficiently slowly so that a leak the size of setpoint 1 can be measured. As soon as the function ZERO is unblocked it is shown in the status display by "Stable".

⇒ Effect of ZERO: When you press the ZERO button, the current leak rate value is set to the lower display limit. Note: The ZERO button should not be pressed when there is a rapidly falling background, otherwise, when compared to the background change, small leak rate signals may be incorrectly hidden.

⇒ Effect of ZERO with ULTRA: The setting automatically activates the ZERO function "ZERO", as soon as the ULTRA measurement range is reached the first time after pressing the START button and the leak rate has been fallen below setpoint 3.

⇒ If you select "OFF", the ZERO button does not work.

3 Save .

⇒ If ZERO is activated, start the function by pressing the ZERO button. See also "ZERO button [ 13]".

**How do I switch on the selected ZERO function?**

Briefly press the ZERO button on the control panel or the touchscreen . Through it the current leak rate value is set to the lower display limit.

**How do I switch off the ZERO function?**

Press the ZERO button on the control panel for more than 2 seconds or on the touchscreen .

### 5.3.9 Change leak rate filter



The leak rate filter "AUTO" is preset. AUTO ensures that the averaging time is optimally adapted to the leak rate range.

Signals are averaged in optimized time intervals, based on the respective leak rate range. In addition, disturbance peaks are eliminated, which are unrelated to the leak rate signals and provides unusually short response times even with low leakage rate signals. The algorithm used offers excellent sensitivity and response time.

With the leak rate filter "Fixed" there is also a filter with a fixed time constant available.

#### Procedure

✓  **Supervisor** - rights


- 1  > Setup > Measurement > ZERO and filter
- 2 Make a selection between "AUTO" and "Fixed" under "Leakage rate filter".
- 3 Save .

### 5.3.10 Change background suppression

The measurement system of the leak detector contains a residual amount of helium and hydrogen even without connection to a test chamber. This creates an internal measurement signal component already before pressing the START button.

After activating "Background suppression" the internal background and selectably also the background in the inlet area is deducted from the leak rate. This happens after pressing the START button automatically.

✓  **Supervisor** - rights

- 1  > Setup > Measurement > ZERO and filter
- 2 Make your selection in the field "Background suppression" between "Internal only", "Inlet area" and "Switched off".

⇒ Internal only

Factory setting. With every measurement the internal measurement signal component of the device is deducted by pressing the START button. The accuracy of the measurement results are no longer impaired by the internal background.

⇒ Inlet area

Additionally to the deduction of the internal background, pressing START with every measurement also deducts the background of the inlet area.

IF you would like to switch this on, make sure that the background of the inlet area is determined, see "Determine the background of the inlet area [▶ 44]".

We recommend that the calculation of the inlet area background is occasionally repeated, because the device pumps down any background present in the inlet area after a certain time.

⇒ Switched off

No background suppression.

### 3 Save .



#### High background value



If the actual background is higher than  $1 \times 10^{-8}$  mbar l/s, it can no longer be automatically deducted. The high background must be pumped down in this case.

### 5.3.10.1 Determine the background of the inlet area

This function determines the value of the internal Helium background.

If "Zero and Filter" are shown in the window under background suppression with value "Inlet area" selected, this value is then deducted from the measured signal when-START is pressed. See also "Change background suppression [▶ 43]".

- ✓ Inlet blank flange
- ✓ Operation mode Vacuum Mode
- ✓ The device is in the state "Standby" or "Measure".

- 1 Select the cross-hair icon .
- 2 Select "Calibration Inlet background."
- 3 To start the automatic determination of the intake background, press .

### 5.3.11 Change the sniffer line pressure monitoring



In the operation mode Sniffing (SL300) automatic pressure monitoring is activated.

The preset pressure limits define a maximum and a minimum inlet pressure. If the pressure does not lie within these limits then generally the caliper is either blocked or broken. Fault messages are issued according to the following rules:

Inlet pressure > Upper limit: Caliper defective.

Inlet pressure < Lower limit: Gas flow is too low through the caliper (blocked caliper).

- ✓  **Supervisor** - rights

- 1  > Setup > Measurement > Sniff > Capillary surveillance
  - ⇒ You can change the following settings, to view the preset values see Factory settings.
    - “Pressure SL300 capillary blocked” (Untergrenze)
    - “Pressure SL300 capillary broken” (Obergrenze)
- 2 Set up.
- 3 Save .

## 5.3.12 Calibrating

In order to be able to measure leak rates correctly, the leak detector has to be adjusted at regular intervals by calibration. The mass spectrometer is tuned automatically.

You can perform the calibration using the device internal calibration leak or use an external calibration leak. Normally calibration should take place on a daily basis or if there is some doubt as to the measurement ability of the device.







### NOTICE

When using Nitrogen or Helium-3 ( $^3\text{He}$ ) as tracer gas an internal calibration is not possible. In this case use an external calibration leak.






The operation modes Vacuum and Sniffer must be separately calibrated when using an external calibration.

A calibration should only take place when the device is at operating temperature. Calibrate at least 20 minutes after switch-on.

### 5.3.12.1 Internal calibration

- ✓   **Operator** or **Supervisor** rights
- ✓ The device is in the state "Standby" or "Measure".
  - 1 Select the cross-hair icon .
  - 2 Select "Internal".
  - 3 Press .
- ⇒ The device performs an internal calibration.

### 5.3.12.2 External calibration

- ✓   **Operator** or **Supervisor** rights
- 1 Mount the calibration leak on the inlet of the device.
- 2  > Setup > Measurement > Calibration leak
- 3 Adjust the leak rate of the calibration leak used, see also "Set external calibration leak [▶ 41]".
- 4 Place the device in the state "Standby" or "Measure".
- 5 Press the cross-hair icon .
- 6 Select "External".
- 7 Press .
- 8 Follow the instructions on the screen.

## 5.4 Measuring

- ✓ The inlet flange on the upper side of the device is prepared for the pending measurement. Optionally connected there: Calibration leak, specimen, sniffer line SL300 or blank flange.
- ✓ If you have a device with an oil sealed backing pump, there is an exhaust line at the exhaust port, see also "Exhaust".
- ✓ Possible alternatives to the operating possibilities on the device are set up (optional):  
I/O module, remote control, WiFi connection to the notebook or tablet. Also see "Accessories and spare parts [▶ 68]" and "Operate leak detector via web browser [▶ 75]".
  - 1 Switch on the leak detector via the mains switch.
  - 2 Make sure that the desired operation mode is set (see "Select operation mode [▶ 38]").
  - 3 Make sure that the correct basic settings and the settings for the current measurement are carried out. See "Basic settings [▶ 28]" and "Settings for the measurements [▶ 38]".
  - 4 Make sure that calibration takes place daily.  
When performing a calibration, note the 20 minute warm-up time. See "Calibrating [▶ 45]".
  - 5 In standby mode, initiate the measurement process by pressing the START button.
  - 6 Keep track of the measurement results either as line, bar or circle graph, see "Presentation of the measurement screen [▶ 31]" and "Assembly of the touchscreen [▶ 15]".
  - 7 To display the maximum leak rate ( $Q_{\max}$ ) on the measurement screen during a measurement, press the START button again. Also see "START button [▶ 12]" and "Assembly of the touchscreen [▶ 15]".
  - 8 To measure small leak rates more easily, press the ZERO button when required, see "Set and use the function ZERO [▶ 41]".
  - 9 Record the measured values if necessary, see "Configure data recording [▶ 47]" and "Assembly of the touchscreen [▶ 15]".
  - 10 Switch the instrument off.

### See also

- 📖 Exhaust [▶ 17]

## 5.5 Measurement data

The measured values are recorded in a database. The data recording can always take place or via the Start-Stop-Button. The measured values can be exported to a USB flash drive (FAT32 format) in the CSV format. The CSV formats are supported in English and German. The extent of the export can be determined through different criteria.

### 5.5.1 Configure data recording


#### NOTICE

##### Reduces the service life of the memory

The recording of many measured values reduces the service life of the internal memory.

- ▶ Disable data recording when you no longer need it.

#### ✓ Operator or Supervisor rights

1  > Setup > Data recording

2 If necessary change the "Max. database size".


⇒ The standard size of the database corresponds approximately to the number of measurement values that can take place throughout the period of one year. This however corresponds to a database size of approx. 16 GB.


⇒ If storage is needed for the recording and the maximum set database size (in measurement values) has been exceeded, the oldest records are automatically deleted so that 5% of the specified capacity is freed for new data.

3 If necessary change "Export file prefix".

⇒ The export files receive the name "Prefix + time stamp + extension (e.g. icmeas20160720-082829.csv).

4 To record immediately after starting the device, activate the option "Enabled".

⇒ This option is deactivated as standard. To start or stop a recording without activating this option press  in the measurement display.

5 Save .

### 5.5.2 Configure and implement export

#### ✓ Operator or Supervisor rights

1  > Measurement data export

2 Select under "Export format" between "CSV en" and "CSV de". Standard is "CSV en".


For "CSV en", the decimal separator is a dot and the column separator is a

comma.

For "CSV de", the decimal separator is a comma and the column separator is a semicolon.

- 3 If necessary change the preset "Sample distance": "Minimum", "1", "2", "5" or "10" seconds.
  - ⇒ With the setting "Minimum" all measured values are exported in the search area.
  - ⇒ With the settings "1", "2", "5" or "10" seconds only the measured values of the search area are exported whose temporal difference is 1, 2, 5 or 10 seconds.
- 4 If necessary change the preset "Time criterion". As choices there are "Back from now" or "Rangeavailable".
 

Make sure that the export process is limited to 1 day maximum. This corresponds to 1 million measurement values with full recording. If you want export data from a larger time period perform several exports.

  - ⇒ "Back from now": A time period can be set in seconds to coincide with the moment retroactive from when the export process should begin.
  - ⇒ "Range": An export time period can be exported. To do this make your entries in the available fields, to start below left and to stop below right.
- 5 Save .
  - ⇒ Storing automatically starts the export.

### 5.5.3 Measurement data database: Information and delete function

✓  **Supervisor** - rights

1  > Data recording

⇒ The following is displayed:

"Current database size" in [Byte]

"Measurement values": Number of measurement values in the database

"Max. database size": Number of measurement values that can be stored in the database

"Level"

"Oldest record": Time stamp of the oldest measurement value


"Newest record": Time stamp of the newest measurement value

2 If it is necessary to delete and re-create the entire database, press on the button "Clear database".

## 5.6 Lock screen

You can protect the screen against unintended operation by accidental movement.

You can activate or deactivate this protection at any time after starting up the device.

**1**  > Lock screen

⇒ The screen lock will be activated and an icon “safety lock” will be displayed on the screen.


**2** To terminate the screen lock, tap the screen in any position and confirm the question in the dialog window.

## 5.7 Use external monitor

You are able to use an external touch monitor instead of the internal monitor. You can use either the internal or the external monitor.

✓ You have a touch monitor with connections for HDMI and USB, furthermore an appropriate power supply. HDMI is required to transmit the images, USB is required to transmit the sound.

**1** Connect the HDMI cable and the USB cable of the touch monitor with the connector block of your leak detector, see also “Connections for accessories and control signals [▶ 19]“. For proper operation, make sure that the cable length does not exceed 3 m.

**2**  > Display > Switch monitor > External monitor


⇒ The picture will be displayed on the external monitor.

▶ Instead of changing the monitor display, you can connect the external monitor before switching on the device.

⇒ Then the picture will be displayed on the external monitor without changing settings.

### Switch to internal monitor

When the instrument is switched on, you will be able to switch to internal monitor at any time.



▶  > Display > Switch monitor > Internal monitor

## 5.8 Information

### 5.8.1 Retrieve information about the device





Diverse information on the device is shown: Software and serial numbers, network information and operating hours.

▶  > Info > Device > Identification


- ▶  > Info > Device > Network
  
- ▶  > Info > Device > Operating hours

## 5.8.2 Call information on the assemblies

Diverse measurement values and information to the following assemblies is shown: Preamplifier, ion source, turbo molecular pump (TMP), processor assembly MSB, backing pump and its frequency converter.




- ▶  > Info > Assemblies > Ion source
  
- ▶  > Info > Assemblies > MSB
  
- ▶  > Info > Assemblies > TMP
  
- ▶  > Info > Assemblies > Preamplifier

## 5.8.3 Information on connected accessories




- ▶  > Info > Accessories > I/O module
- ⇒ If an I/O module is connected, you will find details.

## 5.8.4 Call the energy data information


Diverse measure supply voltages, electrical power and temperatures are shown.

- ▶  > Info > Energy > Power
  
- ▶  > Info > Energy > Voltage (1)
  - ⇒ In this window the first part of the information to the voltage is shown.
  
- ▶  > Info > Energy > Voltage (2)
  - ⇒ In this window the second part of the information to the voltage is shown.

## 5.8.5 Call the latest information to the current measurement value

- ▶  > Info > Measurements > Leak rate and pressure
  - ⇒ The leak rate and different pressure values are shown.
  
- ▶  > Info > measurement values > Temperature
  - ⇒ Different temperature values are displayed.
  
- ▶  > Info > measurement values > running time
  - ⇒ The current runtime information is displayed.

## 5.8.6 Call the latest information to the current calibration value

- ▶  > Info > Calibration

# 5.9 Log

## 5.9.1 Call the error and warning log

- ▶  > Logs > Errors and warnings

If there are more than 20 entries always the oldest entry is deleted.

## 5.9.2 Call the TMP log


Display of the fault and warning history of the turbo molecular pump.

The entries are for the entire period of use of the device. If there are more than 10 entries always the oldest entry is deleted.

- ▶  > Logs > TMP

## 5.9.3 Call calibration log

The entries are for the entire period of use of the device. If there are more than approx. 20 entries always the oldest entry is deleted.

- ▶  > Logs > Calibrations

## 5.9.4 Call maintenance log

- ▶  > Logs > Maintenance

If there are more than 20 entries always the oldest entry is deleted.

## 5.10 Device settings

### 5.10.1 Viewing and customizing individual parameters

You are able to get a quick overview of the actual settings of the device and you can make modifications, if needed.

✓ You have the required right to change the specific parameter.


1  > Sets of parameters > Parameter list

⇒ The device settings will be displayed as a list.

2 Modify individual parameters, if needed.

3 Save .


► To modify parameters, press alternatively a subheading in the list. A separate setting window will be opened, where you can change and save.

⇒ After changing a parameter setting in a separate window press  to return to the list of parameters.

### 5.10.2 Saving and managing sets of parameters


A set of parameters is a collection of parameters with the relevant settings of the device. You are able to save sets of parameters in text-based files at any time. The parameters can be viewed in clearly arranged form.


✓  **Supervisor** - rights

1  > Sets of parameters > Manage sets of parameters


⇒ Sets of parameters already created will be displayed as a list.

If the values of a saved set of parameters match the actual settings of the device 100 %, a green dot will be displayed.

2 To create a new set of parameters, press .

⇒ In the next window you can insert a free text description. The prefix “parameter-set” and the date of saving are used for the file name. Save . You are able to save max 10 sets of parameters.

3 To open the context menu of a created set of parameters, press the desired set of parameter and choose

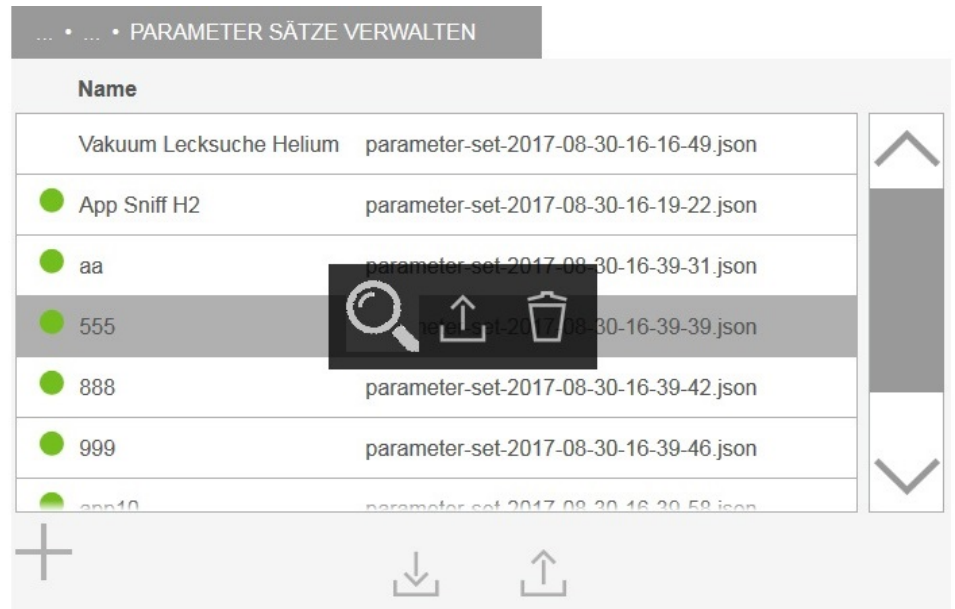
, to view further details concerning the parameters contained. If parameters do not match actual device settings, an orange dot will be displayed.

If there is a missing setting, a red dot will be displayed (after a software update for example). We recommend to view the missing setting, to create a new set of

parameters and to delete the old set of parameters.

, to activate a set of parameters.




, to delete a set of parameters.



### 5.10.3 Exporting or importing sets of parameters

You are able to transfer saved sets of parameters from the internal memory to an attached USB flash drive and to import the sets again.

✓  **Supervisor** - rights

- 1  > Sets of parameters > Manage sets of parameters
- 2 To export all sets of parameters to a USB flash drive (formatted in FAT32) if needed, press  below the list.
- 3 To import all sets of parameters from a USB flash drive into the device, press  below the list.
  - ⇒ All sets of parameters on the USB flash drive will be saved in the device, if the number of 10 is not exceeded. Using a PC you can delete redundant sets of parameters on the USB flash drive before transferring.
  - ⇒ You must not modify parameters of a set of parameters on the USB flash drive before importing. You cannot transfer these files to the device after the modification.

## 5.11 Updating the software

The device has two different software versions: One for the user interface and one for the basic unit. Each has its own independent versions number.

### 5.11.1 Update the user interface software

Import software updates using a USB flash drive.

#### NOTICE

##### Data loss due to an aborted connection

- ▶ Do not switch off the device and do not remove the USB flash drive while the software is being updated!

##### ✓ Supervisor - rights

1 Copy the file into the main directory of a FAT32 formatted USB flash drive.

2 Connect the USB flash drive to a USB port on the device.

3  > Update > Update operating unit

⇒ At the top in the window the active software version of the user interface is shown.

If one or more versions of the software are on the USB flash drive the most recent version is shown on the line below. If this is the same as the version already installed the background is green, otherwise it is red.

4 In order to load the new software version, press on the button "Update".

⇒ After completion there is an automatic restart of the operating unit.

### 5.11.2 Updating the software of the basic unit

Import software updates using a USB flash drive.

#### NOTICE

##### Data loss due to an aborted connection

- ▶ Do not switch off the device and do not remove the USB flash drive while the software is being updated!

##### ✓ Supervisor - rights

1 Copy the file into the main directory of a FAT32 formatted USB flash drive.

2 Connect the USB flash drive to the USB port on the device.

3  > Update > Update basic unit

⇒ At the top in the window the active software version of the basic unit is shown.

If one or more versions of the software are on the USB flash drive the most recent version is shown on the line below. If this is the same as the version already installed the background is green, otherwise it is red.

**4** In order to load the new software version, press on the button "Update".

⇒ After completion there is an automatic restart of the system.

### 5.11.3 Update the software in expert mode

✓  **Supervisor** - rights

**1**  > Update > Update operating unit/basic unit > Expert

⇒ Software versions already available on the device are shown in a list.

**2** Highlight any of the software versions as required and proceed to step 5.

⇒ Resetting to an older software version is possible.

**3** If alternatively you want to add a new software version, connect a FAT32 formatted USB flash drive with the update file to one of the USB ports of the device.

**4** In order to load the new software version, press on .

**5** To activate the new version, select the desired list entry and press .

⇒ After completion there is an automatic restart of the system.

## 5.12 View vacuum diagram

To check the function and the operating state of the measuring system at a glance, call up the simplified diagram of the vacuum diagram.

▶  > Vacuum diagram

## 5.13 Resetting to factory settings


You can restore the device to factory settings.



### Loss of settings and measurement data

After resetting to factory settings only the manufacturer factory settings are in the memory of the device. The software of the device is not reset when restoring the factory settings.

✓  **Supervisor** - rights

▶  > Setup > General > Reset settings > Reset now

## 5.14 Logging off from the device

- 1 Press on your name which appears on the top left of the display.
  - ⇒ The window "User accounts" opens. See also "Modify Personal Settings [▶ 30]".
- 2 You log off from the device via the button "Log off".
  - ⇒ The login window opens.


## 5.15 Switching off the device.

You can switch off the device at the mains switch at any time. The parameters set in the device remain saved.


## 6 Warning and error messages

During operation, the display shows information that helps you operate the instrument. Measurement values are displayed along with current unit modes, operating instructions as well as warnings and error messages. The instrument is equipped with extensive self-diagnostic functions. If the electronics detect a faulty state, the device will show this as far as possible on the display and will interrupt operation when necessary. Warning and error messages consist of a number, a descriptive text, and often an associated measured value (e.g., a measured voltage).


### Warnings

Warnings warn of instrument modes that can impair the accuracy of measurements. Operation of the instrument is not interrupted.  
 For details about the cause and the remedy, press .  
 To close a warning message, press the button "Clear" after reading.


### Error messages

Errors are events that force the interruption of the operation.  
 For details about the cause and the remedy, press .  
 Once you have found the cause for the error continue operation by pressing the button "Clear".


### Active errors and warnings

This menu item is only displayed when the template contains errors or warnings:  
 ▶  > Errors and warnings

### Confirmed warnings

If an active warning is acknowledged without rectifying the cause, it is displayed under "Confirmed warnings".  
 ▶  > Confirmed warnings

### Reference on the display

An overview of possible errors and warnings can be found at:  
 ▶  > Help > Errors and warnings

### 6.1 List of warning and error messages

W102	Timeout during communication with EEPROM on VI-Board	The EEPROM on the VI-Board is defective or does not exist	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>

W104	One EEPROM parameter has been initialized	A new parameter was introduced by a software update	<ul style="list-style-type: none"> <li>• Confirm the warning message</li> <li>• Check that the message does not appear when you restart the device</li> <li>• Check whether the factory settings correspond with the new parameter of your application.</li> </ul>
		The EEPROM on the VI-Board is defective	<ul style="list-style-type: none"> <li>• Confirm the warning message</li> <li>• Check if the message occurs each time when you restart the device</li> <li>• Contact customer service</li> </ul>
W106	Several EEPROM parameters have been initialized	A software update introduced new parameters	<ul style="list-style-type: none"> <li>• Confirm the warning message</li> <li>• Check that the message does not appear when you restart the device</li> <li>• Check whether the factory settings comply with the new parameters of your application.</li> </ul>
		The EEPROM on the VI-Board was replaced	<ul style="list-style-type: none"> <li>• Confirm the warning message</li> <li>• Check that the message does not appear when you restart the device</li> <li>• Check whether the factory settings comply with the new parameters of your application.</li> </ul>
		The EEPROM on the VI-Board is defective	<ul style="list-style-type: none"> <li>• Confirm the warning message</li> <li>• Check if the message occurs each time when you restart the device</li> <li>• Contact customer service</li> </ul>
E107	Internal IIC communication error	Internal IIC communication error	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
E108	Internal IIC2 communication error	Internal IIC2 communication error	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W110	Real-time clock was reset! Please enter date and time	The real-time clock has not been set	<ul style="list-style-type: none"> <li>• Enter the correct date and time</li> <li>• Check that the message does not appear when you restart the device</li> </ul>
		Battery jumper on the MSB not set	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
		Rechargeable battery on MSB is discharged or defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
		Real-time clock defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>

W122	No response from the BUS-Modul	Connection to BUS module interrupted	<ul style="list-style-type: none"> <li>• Check the connection to the BUS module.</li> <li>• Replace the connection cable to the bus module</li> </ul>
		Bus module defective	<ul style="list-style-type: none"> <li>• Replace the bus module</li> </ul>
		Bus module connection on the device defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W125	I/O module no longer connected	Connection to I/O module interrupted	<ul style="list-style-type: none"> <li>• Check the connection to the I/O module.</li> <li>• Replace the connection cable to the I/O module</li> </ul>
		I/O module defective	<ul style="list-style-type: none"> <li>• Replace the I/O module</li> </ul>
		I/O module connection on the device defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W127	Wrong bootloader version	The bootloader is not compatible with application	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
E129	EEPROM contains data from wrong device class	The software of the basic unit does not match the EEPROM	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
		The EEPROM does not match this device class	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W151	No communication with operating unit	A software update or a parameter reset has been executed	<ul style="list-style-type: none"> <li>• Confirm the warning message</li> <li>• Check that the message does not appear when you restart the device</li> </ul>
		Internal connection problem between the basic unit and the operating unit	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W152	No communication with control panel	Internal connection problem between the basic unit and the control panel	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W171	CU1000 not supported	A CU1000 can not be used with this device	<ul style="list-style-type: none"> <li>• Disconnect the CU1000 from this device</li> </ul>
W201	Voltage U24V_MSB too low	Malfunction of 24V power supply unit	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
		Short circuit or overload in the 24V supply	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W202	Voltage U24V_MSB too high	Malfunction of 24V power supply unit	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W203	24V valve supply voltage out of range	Malfunction of a valve	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
		Short circuit or overload in the 24V valve supply	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>

W206	24V operating unit supply voltage out of range	Malfunction of operating unit	• Contact customer service
		Short circuit or overload in the 24V operating unit supply	• Contact customer service
W207	12V internal supply voltage out of range	Short circuit or overload in the 12V supply	• Contact customer service
W208	24V fan supply voltage out of range	Malfunction of a fan	• Contact customer service
		Short circuit or overload in the 24V fan supply	• Contact customer service
W209	24V DIV1 supply voltage out of range	Short circuit or overload in the 24V DIV1 supply	• Contact customer service
W210	24V DIV2 supply voltage out of range	Short circuit or overload in the 24V DIV2 supply	• Contact customer service
W211	5V internal supply voltage out of range	Short circuit or overload in the internal 5V supply	• Contact customer service
W212	5V sniffer line supply voltage out of range	Sniffer line defective	• Use another sniffer line, if possible • Contact customer service
		Short circuit or overload in the 5V sniffer line supply	• Contact customer service
W221	Internal voltage 24V_RC voltage out of range	The remote control is defective	• Use another remote control, if possible
		The cable connected to REMOTE CONTROL connector is defective	• Use another cable, if possible
		The accessory connected to ACCESSORIES connector is defective	• Use another accessory, if possible
		The cable connected to ACCESSORIES connector is defective	• Use another cable, if possible
		Short circuit or overload in the 24V_RC supply	• Contact customer service
W222	Internal voltage 24V_IO voltage out of range	The module connected to LD connector is defective	• Use another module, if possible
		The cable connected to LD connector is defective	• Use another cable, if possible
		Short circuit or overload in the 24V_IO supply	• Contact customer service
W223	Internal voltage 24V_TMP1 voltage out of range	Short circuit or overload in the 24V_TMP1 supply	• Contact customer service

W224	Internal voltage 24V_PRESSURE (Pirani) voltage out of range	Short circuit or overload in the 24V_PRESSURE (Pirani) supply	• Contact customer service
W240	Voltage +15V out of range	Short circuit at preamplifier	• Contact customer service
		VI-Board or MSB defective	• Contact customer service
W241	Voltage -15V out of range	Short circuit at preamplifier	• Contact customer service
		VI-Board or MSB defective	• Contact customer service
E242	+15V or -15V voltage shorted	Short circuit at preamplifier	• Contact customer service
		VI-Board or MSB defective	• Contact customer service
W250	REF5V voltage out of range	Short circuit at preamplifier	• Contact customer service
		VI-Board or MSB defective	• Contact customer service
E252	REF5V voltage shorted	Short circuit at preamplifier	• Contact customer service
		VI-Board or MSB defective	• Contact customer service
W300	Anode voltage too low	Short circuit of the anode voltage	• Contact customer service
		VI-Board or MSB defective	• Contact customer service
W301	Anode voltage too high	MSB defective	• Contact customer service
W302	Suppressor voltage too low	Short circuit suppressor or preamplifier	• Contact customer service
		VI-Board or MSB defective	• Contact customer service
W303	Suppressor voltage too high	MSB defective	• Contact customer service
W304	Anode-cathode voltage too low	Short circuit between anode and cathode	• Contact customer service
		VI-Board or MSB defective	• Contact customer service
W305	Anode-cathode voltage too high	MSB defective	• Contact customer service
E306	Anode voltage wrong	The anode voltage set value is outside the allowable range	• Perform a calibration • Contact customer service
		MSB defective	• Contact customer service

W310	Cathode 1 broken	Cathode defective	<ul style="list-style-type: none"> <li>• Check that the other cathode has been switched on</li> <li>• Contact customer service</li> </ul>
		Connection to cathode broken	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
		VI-Board or MSB defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W311	Cathode 2 broken	Cathode defective	<ul style="list-style-type: none"> <li>• Check that the other cathode has been switched on</li> <li>• Contact customer service</li> </ul>
		Connection to cathode broken	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
		VI-Board or MSB defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
E312	Cathodes broken	Both cathodes defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
		Connection to cathode broken	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
		VI-Board or MSB defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
E340	Emission error	Pressure too high with aged cathode	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W342	Cathode not connected	Both cathodes defective during self test	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
		Plug of ion source not connected	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W350	Suppressor not connected	Suppressor cable not connected or defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
E352	Preamplifier not connected	Preamplifier defective or cable not connected	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W358	Alternate preamplifier ranges	Preamplifier defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
		Unusual leak rate waveform	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W359	Overdriven preamplifier	Ion source or preamplifier defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
		Mass spectrometer contaminated	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W360	Preamplifier output too low	Ion source bad	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
		Mass spectrometer contaminated	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W361	The offset voltage of the preamplifier is too high	Preamplifier defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W362	Preamplifier range error	Preamplifier defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
		MSB defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W390	500 GOhm resistor out of range	Preamplifier defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
		MSB defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>

E400	TMP error message	Unhandled error message from the TMP	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
E402	No communication with turbo pump converter	TMP cable defective or not connected	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
		TMP converter defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
		MSB defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W405	No TMP run-up time	Inlet pressure during run-up too high	<ul style="list-style-type: none"> <li>• Check that the backing pump is working during run-up</li> <li>• Check that the pressure drops during run-up</li> <li>• Contact customer service</li> </ul>
		TMP bearing damage	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
E410	TMP temperature too high	The ambient temperature is too high	<ul style="list-style-type: none"> <li>• Turn off the device and let it cool down</li> <li>• Reduce the temperature in the environment in which the device stands</li> </ul>
		Air filter dirty	<ul style="list-style-type: none"> <li>• Clean the air vents or replace the filter plates</li> </ul>
		Fan blocked or defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
E422	No TMP run-up time	Inlet pressure during run-up too high	<ul style="list-style-type: none"> <li>• Check that the backing pump is working during run-up</li> <li>• Check that the pressure drops during run-up</li> <li>• Contact customer service</li> </ul>
		TMP bearing damage	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
E430	TMP bearing temperature too high (one hour > 60°C)	The ambient temperature is too high	<ul style="list-style-type: none"> <li>• Turn off the device and let it cool down</li> <li>• Reduce the temperature in the environment in which the device stands</li> </ul>
		Air filter dirty	<ul style="list-style-type: none"> <li>• Clean the air vents or replace the filter plates</li> </ul>
		Fan blocked or defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>

W431	TMP bearing temperature too high (> 60°C)	The ambient temperature is too high	<ul style="list-style-type: none"> <li>• Turn off the device and let it cool down</li> <li>• Reduce the temperature in the environment in which the device stands</li> </ul>
		Air filter dirty	<ul style="list-style-type: none"> <li>• Clean the air vents or replace the filter plates</li> </ul>
		Fan blocked or defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
E500	Pressure sensor p1 not connected	Pressure sensor p1 not connected or cable defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
		VI-Board or MSB defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
E502	Pressure sensor p2 not connected	Pressure sensor p1 not connected or cable defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
		VI-Board or MSB defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
E520	Pressure too high	Pressure p2 too high for at least 15s	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
E521	Pressure rise, anode voltage collapsed	Pressure rise at pressure sensor p2 and anode voltage collapsed	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W522	Pressure rise, emission break down	Pressure rise at pressure sensor p2 and emission collapsed	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W540	Flow through capillary is too low! Leaks may not be detectable!	Filter is dirty	<ul style="list-style-type: none"> <li>• Replace the sniffer tip filter</li> </ul>
		Sniffer tip or capillary blocked	<ul style="list-style-type: none"> <li>• Remove the blocking of the sniffer tip</li> <li>• Use another sniffer line, if possible</li> <li>• Contact customer service</li> </ul>
		The pressure limit for a blocked capillary is set too high	<ul style="list-style-type: none"> <li>• Check and change the pressure limit, if necessary</li> </ul>
W541	Flow through capillary is much too low Leaks may not be detectable!	Filter is dirty	<ul style="list-style-type: none"> <li>• Replace the sniffer tip filter</li> </ul>
		Sniffer tip or capillary blocked	<ul style="list-style-type: none"> <li>• Remove the blocking of the sniffer tip</li> <li>• Use another sniffer line, if possible</li> <li>• Contact customer service</li> </ul>
		The pressure limit for a blocked capillary is set too high	<ul style="list-style-type: none"> <li>• Check and change the pressure limit, if necessary</li> </ul>

W542	Flow through capillary too high	Capillary broken or leaky	<ul style="list-style-type: none"> <li>• Use another sniffer line, if possible</li> <li>• Contact customer service</li> </ul>
		The pressure limit for a broken capillary is set too low	<ul style="list-style-type: none"> <li>• Check and change the pressure limit, if necessary</li> </ul>
W559	Leak rate too high! Switched to Standby to prevent contamination	Gross leak at test object or the connection to the test object	<ul style="list-style-type: none"> <li>• Check the tightness of the connection between the leak detector and the test object</li> </ul>
		Gross leak protection limit is set too low	<ul style="list-style-type: none"> <li>• Check and change the gross leak protection limit, if necessary</li> </ul>
		Alarm delay time too short	<ul style="list-style-type: none"> <li>• Check and change the alarm delay, if necessary</li> </ul>
W580	Maximum evacuation time until 100 mbar exceeded	Gross leak at test object or the connection to the test object	<ul style="list-style-type: none"> <li>• Check the tightness of the connection between the leak detector and the test object</li> <li>• Use another test object, if possible</li> </ul>
		The settings value for the max. evacuation time gross leak is too low	<ul style="list-style-type: none"> <li>• Check and change the max. evacuation time gross leak if necessary</li> </ul>
W581	Maximum evacuation time until measurement exceeded	Gross leak at test object or the connection to the test object	<ul style="list-style-type: none"> <li>• Check the tightness of the connection between the leak detector and the test object</li> <li>• Use another test object, if possible</li> </ul>
		The settings value for the max. evacuation time until measurement is too low	<ul style="list-style-type: none"> <li>• Check and change the max. evacuation time until measurement if necessary</li> </ul>
W630-Phoenix	Calibration request	Operation mode or mass has changed	<ul style="list-style-type: none"> <li>• Perform a calibration</li> </ul>
		Runtime over 30 minutes and temperature change by 5 Kelvin since last calibration	<ul style="list-style-type: none"> <li>• Perform a calibration</li> </ul>
		Runtime over 30 minutes and no calibration since 24 hours	<ul style="list-style-type: none"> <li>• Perform a calibration</li> </ul>
W670	Calibration error (emission breakdown)	During calibration the emission collapsed	<ul style="list-style-type: none"> <li>• Check if the message occurs again when you perform a new calibration</li> <li>• Contact customer service</li> </ul>

W700	Preamplifier temperature is too low	Ambient temperature is too low	<ul style="list-style-type: none"> <li>• Increase the temperature in the environment in which the device stands</li> </ul>
		Temperature sensor is defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W702	Preamplifier temperature is too high	The ambient temperature is too high	<ul style="list-style-type: none"> <li>• Reduce the temperature in the environment in which the device stands</li> </ul>
		Air filter dirty	<ul style="list-style-type: none"> <li>• Clean the air vents or replace the filter plates</li> </ul>
		Fan blocked or defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W710	MSB temperature is too high	The ambient temperature is too high	<ul style="list-style-type: none"> <li>• Reduce the temperature in the environment in which the device stands</li> </ul>
		Air filter dirty	<ul style="list-style-type: none"> <li>• Clean the air vents or replace the filter plates</li> </ul>
		Fan blocked or defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
E711	Max. MSB temperature exceeded	The ambient temperature is too high	<ul style="list-style-type: none"> <li>• Reduce the temperature in the environment in which the device stands</li> </ul>
		Air filter dirty	<ul style="list-style-type: none"> <li>• Clean the air vents or replace the filter plates</li> </ul>
		Fan blocked or defective	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W901	Maintenance: TMP bearing lubricant	Maintenance interval for TMP bearing lubricant exceeded	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W903	Maintenance: Calibration leak expired	Maintenance interval for calibration leak exceeded	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W904	Maintenance: Sniffer tip filter	Maintenance interval for sniffer tip filter exceeded	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W910	Maintenance: Backing pump	Maintenance interval for backing pump exceeded	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W920	Maintenance: Exhaust filter	Maintenance interval for exhaust filter exceeded	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>
W925	Maintenance: Air filter	Maintenance interval for air filter exceeded	<ul style="list-style-type: none"> <li>• Contact customer service</li> </ul>

## 7 Cleaning

All cleaning work that was described here may only be done without opening the device!



### **WARNING**

#### **Life threatening hazard from electric shock**

High voltages are inside the device. Touching parts where electrical voltage is present can result in death.

- ▶ Disconnect the device from the power supply prior to any maintenance work. Ensure that the electrical supply cannot be switched back on unintentionally.
- ▶ Don't open the device!

The housing of the device is composed of painted plastic parts. For cleaning the device, means should be used, as are also common to other varnish or plastic surfaces (e.g., light household cleaners).

Usually, a damp cloth is enough. Solvents that could dissolve lacquers (such as acetone) should not be used.

Use a soft brush or a vacuum cleaner to clean the ventilation slots.

## 8 Accessories

### 8.1 Accessories and spare parts

The parts listed below can additionally be ordered:

<b>Sniffer line</b>	
SL300, 4 m length	252003
QT100 Helium Sample Probe QUICKTEST	15594
<b>Remote control</b>	
Remote control RC310, wired	252013V01
Remote control RC310WL, wireless	252014V01
<b>Miscellaneous</b>	
Search gas spray gun for Helium, with hose	16555

#### Sniffer line SL300

By using the sniffer line the leak detector can easily be converted to a sniffer leak searcher. The length of the sniffer line is 4 m.

#### QUICKTEST QT100

The QT 100 ensures a quick suction of the tracer gas and thus for a short response time. This enables sniffing leak detection for larger distances between the test object and the leak detector. For the QT100 sniffer lines are available with 5 m, 20 m or 50 m length.

#### Remote control RC310C and RC310WL

With the RC310C remote control you can operate the leak detector over a cable with a length of up to 28 m.

With the wireless remote control RC310, you can operate the leak detector at a distance of up to 100 m.

Via remote control you control the functions START, STOP / VENT (STOP/Ventilate), ZERO (background). The measured leak rate is displayed as a bar graph, as a numeric value or as a diagram on the display of the remote controls (see the RC310 Technical Manual).

Measurement values you create over a recording time of up to 24 hours in the internal memory of the remote controls. You transfer the data easily to a USB flash drive.



You can set an internal threshold for warning when exceeding the set points. The warning occurs visually on the display and audibly via the built-in loudspeaker or the connected headset respectively.

The remote controls are placed in robust housings that allow ergonomic operation. Magnets on the lower side allow installation from horizontal to vertical metal surfaces.

## 8.2 I/O module

### 8.2.1 Create a connection between the device and the I/O module



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- 1 Connect the I/O module with a data cable to the LD socket on the rear of the device, see "Connections for accessories and control signals [► 19]".
- 2  > Setup > Accessories > Device selection
- 3 Select the "IO module".
- 4 Save .

### 8.2.2 Configuring digital outputs

The digital outputs PLC-OUT 1 ... The available functions can be assigned in any way necessary to the 8 I/O module.

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- 1  > Setup > Accessories > I/O module > Digital outputs configuration
- 2 Select the desired "Digital output".
  - ⇒ The outputs PLC-OUT 1 - 8 are available.
- 3 Select the desired "Function", see the table below.
- 4 Select the desired "Mode".
  - ⇒ The modes "Standard" or the mode "Inverse" are available for selection.
  - To mode "Inverse": In the table overview the description of the state "open" must be replaced with the description of the state "closed".
- 5 Save .

Function	State:	Description
Off (open)	open:	always open
Ready for operation	closed:	Emission switched on, calibration process inactive, no error
	open:	Emission switched off or calibration process active or error
Emission on	closed:	Emission switched on
	open:	Emission switched off
Error	closed:	Error
	open:	No error
Error or warning	closed:	Error or warning

Function	State:	Description
	open:	No error or warning
Run-up	closed:	Run-up
	open:	no run-up
Calibration request	closed:	No external calibration: Calibration required When external calibration or "CAL check": Request "Open or close external calibrated leak"
	open:	No request: Calibration not required
Calibration active	closed:	Device is calibrated.
	open:	Device is not calibrated.
Calibration stable	closed:	Calibration completed with calibration leak
	open:	Assignment not stable or calibration is inactive
Cathode 2	closed:	Cathode 2 is active
	open:	Cathode 1 is active
Measuring	closed:	Measuring (ZERO is possible, all setpoint outputs switch depending on the leak rate.)
	open:	Standby or emission disabled (ZERO is not possible, all setpoint outputs will return "Leak rate threshold value exceeded".)
Open	open:	always open
Sniff	closed:	Operation mode Sniffing active
	open:	Operation mode Vacuum active
Setpoint 1	closed:	Measured leak rate exceeds the setpoint 1
	open:	Measured leak rate undercuts the setpoint 1
Setpoint 2	closed:	Measured leak rate exceeds the setpoint 2
	open:	Measured leak rate undercuts the setpoint 2
Setpoint 3	closed:	Measured leak rate exceeds the setpoint 3
	open:	Measured leak rate undercuts the setpoint 3
Setpoint 4	closed:	Measured leak rate exceeds the setpoint 4
	open:	Measured leak rate undercuts the setpoint 4
Purge	closed:	Purge valve open
	open	Purge valve closed
Standby or evacuate	closed:	State standby or evacuate active
	open:	State standby of evacuate not active, such as when measuring

Function	State:	Description
Status calibration leak valve	closed:	Test leak valve is open
	open:	Test leak valve is closed
Warning	closed:	Warning
	open:	No warning
ZERO active	closed:	ZERO switched on
	open:	ZERO switched off

### 8.2.3 Configure digital inputs

These inputs can be used to operate the device with a programmable logic controller (PLC).



The digital inputs PLC-IN 1 ... The available functions can be assigned in any way necessary to the 10 I/O module.

- Active signal: typically 24 V
- Inactive signal: typically 0 V.

The 24V output of the I/O module can be used as an active signal.

Every function can be inverted.

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- 1  > Setup > Accessories > I/O module > Digital inputs configuration
- 2 Select as desired "Digital input".
  - ⇒ The inputs PLC-IN 1 - 10 are available.
- 3 Select the desired Function, see the table below.
- 4 Select the desired Mode.
  - ⇒ The modes "Standard" or the mode "Inverse" are available for selection.
  - To mode "Inverse": In the following table overview, the arrow pointing the transfer direction in the column "Transition" must be reversed.
- 5 Save .

Function	Transition	Description
Vent	inactive→ active:	Vent inlet (only in standby state)
CAL	inactive→ active:	Start calibration.
	active→ inactive:	Apply value for background and finish calibration.
No function	-	The input is not functioning. Recommended setting of unused inputs.
Delete	inactive→ active:	Erase warning or error message / cancel calibration.
Sniff	inactive→ active:	Enable sniffer mode.
	active→ inactive:	Enable vacuum mode.

Function	Transition	Description
Purge	inactive→ active:	Switch-on purge (only in standby state)
	active→ inactive:	Switch-off purge (only in standby state)
Start	inactive→ active:	Change to the measurement mode.
Start/Stop	inactive→ active:	Change to the measurement mode.
	active→ inactive:	Switch to Standby.
Stop	inactive→ active:	Switch to Standby.
ZERO	inactive→ active:	Switch ZERO on.
	active→ inactive:	Switch ZERO off.

### 8.2.4 Configure analog outputs

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1  > Setup > Accessories > I/O module > Analog outputs configuration

2 Set-up the "Analog output 1".

⇒ You can choose from "Off", Pressure p1", Pressure p2", "Leak rate mantissa", "Leak rate exponent", "Leak rate linear", "Leak rate logarithmic", "Leak rate mantissa hyst.", and "Via interface".

3 Set-up the "Analog output 2".

⇒ You can choose from "Off", Pressure p1", Pressure p2", "Leak rate mantissa", "Leak rate exponent", "Leak rate linear", "Leak rate logarithmic", "Leak rate mantissa hyst.", and "Via interface".

4 Set-up the "Analog output scale".

⇒ You can choose from "0.5 V / decade", "1 V / decade", "2 V / decade", "2.5 V / decade", "3 V / decade", "5 V / decade", or "10 V / decade".

5 Set-up the "Exponent upper limit".

6 Save .



The settings "Analog output scaling" and "Upper limit exponent" affect both analog outputs dependent on the selected function, see the table overview below.

#### Functions and assignment of analog outputs:


Off	The analog outputs are switched off (Output voltage = 0 V).
-----	--

Pressure p1 / Pressure p2	1 ... 10 V; 0.5 V / decade; logarithmic $1 \text{ V} = 1 \times 10^{-3} \text{ mbar}$	
Leak rate mantissa	1 ... 10 V; linear; in the selected unit	Useful only if the other analog output is assigned "Leak rate exponent".
Leak rate exponent	1 ... 10 V; 0.5 V / decade; Step function; $1 \text{ V} = 1 \times 10^{-12}$ ; in selected unit	Useful only if the other analog output "Leak rate mantissa" or "Leak rate mantissa hyst." is assigned.
Linear leak rate	0 ... 10 V; linear; in the selected unit	The upper limit (= 10 V) is set via the parameter "Exponent upper limit" in whole decades. The lower value is always 0 (leak rate), which corresponds to 0 V output voltage.  This setting is for both analog outputs, if an appropriate output function is selected. Depending on the selected leak rate unit there is a different absolute limit.  The selected range can be additionally narrowed by the limits, which is valid for all interfaces.
Leak rate log.	0 ... 10 V; logarithmic; in the selected unit	The upper limit (= 10 V) and the scale (V / decades) are set via the parameters "Exponent upper limit" and "Analog output scale".  For example: Upper limit set to $1 \times 10^{-5} \text{ mbar l/s}$ (= 10 V). Scale set to 5 V / decade. The lower limit is thus $1 \times 10^{-7} \text{ mbar l/s}$ (= 0 V). The logarithmic output function of both the slope in V / decade as well as the upper limit (10 V limit) can be set. This results in the minimum displayable value. The following slopes are available: 0.5, 1, 2, 2.5, 3, 5, 10 V/ The higher the selected slope value, the smaller the displayable area. The upper limit is the same for both analog outputs. Depending on the selected leak rate unit there is a different absolute limit.
Set by interface	The output voltage can be specified for tests with the LD log command 221.	
Leak rate mantissa hyst.	0.7 ... 10 V; linear; in the selected unit	Useful only if the other analog output is assigned "Leak rate exponent". Through an overlap of the mantissa in the range 0.7 to 1.0, a constant jumping between two decades is prevented. 0.7 V corresponds to a leak rate of $0.7 \times 10^{-x}$ . 9.9 V corresponds to a leak rate of $9.9 \times 10^{-x}$ .

## 8.2.5 Setting up the I/O module protocol

To switch between ASCII and LD protocol.

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1  > Setup > Accessories > I/O module > I/O module protocol

2 Set up.

3 Save .

## 8.3 Operate leak detector via web browser

### NOTICE

#### Operating system can be attacked via USB or Ethernet

The Linux operating system used in the leak detector is not updated automatically and can therefore contain security gaps. This vulnerability may be exploited through the Ethernet and USB interfaces of the leak detector to provide unauthorized access to the system.

- ▶ Ensure that no unauthorized person has access to these interfaces, for example through a USB port / Ethernet port lock.
- ▶ In order not to jeopardize the security of your company network, never connect the leak detector directly to the public Internet. This is true for connections over WLAN as well as over Ethernet.
- ▶ However, if you want to access the web interface of the leak detector remotely, we recommend an encrypted Virtual Private Network (VPN) connection. However, we cannot assume any guarantee for the security of VPN connections, which are provided by third parties.

In order to be able to access the user interface of the device via WiFi there needs to be a WiFi capable USB adapter with WiFi Access Point technology inserted in the rear of device.

Minimum technical requirements:

- Interface: USB 2.0
- USB port: Type A
- Chipset: RTL819x or similar
- Support to: Access Point Client Mode


"EDIMAX EW-7612UAn V2" is a WiFi capable USB adapter, which meets the specification and has been tested with the leak detector.



The WiFi connection can be susceptible to interference. The stability depends on the range, shielding walls, other WiFi networks, interfering transmitters in the vicinity and other factors.

### 8.3.1 Configure the WiFi connection of the leak detector

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1  > Setup > Network > WiFi

2 In the field "SSID" enter the desired network name and in the field "Password" the desired password. "SSID" and "Password" have the following values preset: "Phoenix" or "phoenix40" respectively. The password should have at least 8 characters.

3 To set-up that the device supports the WiFi connection activate the option "Enabled".

⇒ If the WiFi capable USB adapter is inserted, this will automatically start the Access Point. In order to configure the WiFi adapter of the leak detector, no USB adapter needs to be inserted.

4 Save .

### 8.3.2 Set-up the WiFi connection in the notebook or tablet



#### WiFi connection - quick-start

If you have already performed these preset work steps, then on most devices it is sufficient just to enter the URL.

- ✓ A WiFi capable USB adapter with WiFi Access Point Technology is connected to a USB port on the rear of the leak detector, see "Connections for accessories and control signals [▶ 19]".
  - ✓ In the configuration of the leak detector, the option "Enabled" is activated, see Configure the WiFi connection of the leak detector [▶ 76].
  - ✓ The WiFi connection is automatically detected by the client.
  - ✓ With old devices WPA2 may need to be set-up as the encoding.
  - ✓ Java Script is enabled in the web browser. We recommend using a current version of the web browser Chrome™, Firefox® or Safari®.
- 1 Check in the WiFi settings of your notebook or tablet whether it is already connected the WiFi of the leak detector.
  - 2 If it is not connected to the WiFi of the leak detector, select the WiFi of the leak detector and enter if necessary the password, see "Configure the WiFi connection of the leak detector [▶ 76]", handling step 2.

- 3** To access the leak detector via the web browser of the notebook or tablet, use the following URL:  
phoenix.leybold.com
- ⇒ The current active user interface of the leak detector is called.
- ⇒ When using a notebook or tablet the same functionality is available as with the touchscreen of the leak detector.

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